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**Via InstaTool**

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Members of the NAPM LLC and its  
Future of NPAC Subcommittee

**Re: 2015 LNPA Vendor Qualification Survey Legal Opinion – NeuStar, Inc.**

Ladies and Gentlemen:

Pursuant to Sections 3.4 and 3.5 of the 2015 LNPA Vendor Qualification Survey (“VQS”) issued by the Future of NPAC (“FoNPAC”) Subcommittee of the North American Portability Management LLC (“NAPM LLC”) on February 5, 2013 for the selection of a vendor to serve as the next local number portability administrator (“LNPA”),<sup>1</sup> I hereby provide to the Federal Communications Commission (“FCC”), the NAPM LLC and the FoNPAC a legal opinion (“Legal Opinion”) substantiating the neutrality of NeuStar, Inc. (“Neustar”).

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<sup>1</sup> On February 5, 2013, the FoNPAC made a set of Request for Proposal (RFP) documents available to potential vendors. The RFP documents include a Vendor Qualification Survey (“VQS”), a Technical Requirements Document (“TRD”) and a Request for Proposal (“RFP”). Hereinafter, these documents will collectively be referred to as the “RFP Documents.”

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For purposes of this Legal Opinion, I have examined and relied upon such materials and information available to me, as more specifically described below (collectively, the "Examined Documents"). Also for purposes of this Legal Opinion, I have considered such matters of law and the published and effective rules, policies, orders, decisions and reports of the FCC and of fact as I have deemed appropriate as a basis for this Legal Opinion.

In rendering this Legal Opinion, I have assumed without investigation: (i) the authenticity and completeness of the Examined Documents submitted to me by Neustar for my examination, whether or not they were submitted to me as originals, (ii) the authenticity of any signatures and the legal capacity of any persons executing such documents, (iii) the conformity to authentic original documents of all Examined Documents submitted to me as copies, (iv) the accuracy and completeness of all records made available to me by Neustar (except as otherwise stated herein), and (v) the validity and binding effect of all the Examined Documents upon the parties thereto.

I have no Actual Knowledge (as that phrase is explained below) of any factual information that has led me to conclude that the Examined Documents contain any untrue statement of a material fact, or omit to state a fact whose inclusion therein would be required in order to render the statements contained therein not materially misleading in the context in which such statements were made, except to the extent that any such statements conflict with or are modified by matters specifically addressed herein.

This Legal Opinion is limited strictly to the matters discussed herein, and I express no opinion with respect to any law, statute, rule, regulation, ordinance, decision, judgment, decree, legal requirement, legal authority or factual matter whatsoever.

This Legal Opinion constitutes a written communication delivered to the FCC, the NAPM LLC and the FoNPAC for the purpose of responding to the *VQS* and for use in connection with an evaluation of Neustar pursuant to a RFP. I am a lawyer licensed and in good standing to practice law in the State of Maryland. My law firm, DLA Piper LLP (US), and I have conducted the LNPA neutrality audits since 2002 as the auditor mutually agreed upon by Neustar and the NAPM LLC. During these prior 10 years, we have developed some level of expertise on number administration neutrality matters generally. Neither the law firm nor I provide legal services to Neustar other than those provided in connection with the LNPA neutrality audits and this Legal Opinion.

Paragraphs 1b, 1c and 2 of Section 3.4 of the *VQS* inquire about the existence and activity of affiliates of Neustar. To the extent these inquiries ask about affiliates based on ownership interests in Neustar, I have undertaken a review of ownership of Neustar capital stock during the period January, 2012 through March, 2013. This review consisted of my examination of lists prepared by a third-party vendor, Thomson Reuters, of the 100 largest shareholders of Neustar stock, based on the vendor's market research. In an abundance of caution, I elected to review additional historical information on Neustar shareholders consisting of two more years of data, from these same Thomson Reuters lists. Thus, in all my reviews of Neustar stock ownership



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referenced in this Legal Opinion, my examination covers a look-back period of more than 3 years, from January, 2010 through March, 2013.

This Legal Opinion constitutes a third party legal opinion governed by and subject to the Restatement (Third) of the Law Governing Lawyers. This Legal Opinion is also governed by, and shall be interpreted in accordance with, the Legal Opinion Accord of the American Bar Association Section of Business Law (1991) (“Accord”), and as such, my Legal Opinion is subject to a number of qualifications, exceptions, and limitations, all as more particularly described in the Accord, and should be read in conjunction therewith. As such, my Legal Opinion is subject to my Actual Knowledge, as defined in the Accord, that is, the conscious awareness of facts or other information by me.

#### Legal Opinion Summary

For the reasons stated below, it is my legal opinion that Neustar, a non-governmental entity, is impartial and is not aligned with any particular telecommunications industry segment, and can assure that access to the NPAC/SMS for all qualified users is at all times evenhanded, impartial and nondiscriminatory. It is my further legal opinion that Neustar is currently a Neutral Third Party as that term is defined in Section 3.4 of the *VQS*, and based on Neustar’s existing neutrality practices and procedures, Neustar can at all times remain a Neutral Third Party. Moreover, Neustar does not intend to engage or include any subcontractors in providing the services requested in the *RFP Documents*. It is my further legal opinion that the absence of such subcontractors eliminates any concern regarding the Neutral Third Party status of any subcontractor.

I first opine on the enumerated neutrality requirements set forth in the *VQS*, followed by my opinions on other neutrality requirements and considerations outlined in the *VQS*.

#### Numbered *VQS* Neutrality Requirements

##### **(1) a. Neustar is Not a Telecommunications Service Provider.**

It is my legal opinion that Neustar does not qualify under any of the three forms of Telecommunications Service Provider set forth in Section 3.4 of the *VQS*.

First, in connection with facilities-based wireline local exchange service, Neustar does not possess the requisite authority to engage in the provision to the public of facilities-based wireline local exchange service in any State or Territory of the United States. According to Neustar, it has not been issued, nor has it applied for, a Certificate of Public Necessity and Convenience (“CPCN”) or any similar authorization, license or approval issued by a state public



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utility commission for the provision of facilities-based wireline local exchange service. This is verified by the FCC Form 499 Filer Database ("FCC 499 List"), which contains a current list of all providers of any telecommunications service in any state or territory of the United States.<sup>2</sup> Based on my review of the FCC 499 List as of September, 30, 2012, December 31, 2012, and March 25, 2013, Neustar is not on the FCC 499 List as a provider of any telecommunications service in any state or territory of the United States, including facilities-based wireline local exchange service or any other local exchange service. Moreover, as noted in footnote 2, all providers of facilities-based wireline local exchange service are required to file Form 499-A with the FCC, and as the date hereof, according to Neustar it has not filed Form 499-A with the FCC, nor is it required to do so.

Also in connection with facilities-based wireline local exchange service, it should be noted that in its role as the North American Numbering Plan Administrator ("NANPA") and National Thousands-block Pooling Administrator ("PA"), Neustar is permitted to issue telephone numbers or central office codes only to entities that can, among other things, demonstrate that they have the requisite authority to provide service in the area in which they are seeking numbers or codes. In accordance with guidelines established by the Industry Number Council, such authority for facilities-based wireline local exchange service providers can be demonstrated by a CPCN or other similar document. Accordingly, Neustar is familiar with all of the ways in which the requisite authority to provide such services can be obtained and documented. According to Neustar, it does not possess, nor is it seeking, any such authority.

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<sup>2</sup> The list of 499 filers is an important tool to ensure compliance with telecommunications numbering neutrality rules because it is the most comprehensive list of the providers of telecommunications services of which Neustar is aware. The instructions for the 2012 Form 499-A explain that "[w]ith very limited exceptions, all intrastate, interstate, and international providers of telecommunications in the United States must file this Worksheet. Telecommunications providers that are contributors to any of the support mechanisms, including USF, TRS, NANPA, or LNPA, must file this Worksheet." The instructions continue by stating that "the term 'interstate telecommunications' includes, but is not limited to, the following types of services: wireless telephony, including cellular and personal communications services (PCS); paging and messaging services; dispatch and operator services; mobile radio services; access to interexchange service; special access; wide area telecommunications services (WATS); subscriber toll-free and 900 services; message telephone services (MTS); private line; telex; telegraph; video services; satellite services; resale services; Frame Relay services; asynchronous transfer mode (ATM) services; Multi-Protocol Label Switching (MPLS) services; audio bridging services; and *interconnected VoIP services*." (*emphasis added*). The instructions also explain that "[a]ll providers of 'non-interconnected VoIP service' . . . with interstate end-user revenues subject to TRS contributions must file this Worksheet in order to register with the Commission and report their revenues for purposes of calculating TRS contributions." *2012 Telecommunications Reporting Worksheet Instructions (FCC Form 499-A)*, Approved by OMB 3060-0855, available at <http://www.fcc.gov/document/2012-form-499-instructions> at 2 (footnotes omitted). Thus, the list of 499 filers includes wireline and wireless telecommunications service providers, interconnected VoIP providers and even non-interconnected VoIP providers.



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Second, in connection with Commercial Mobile Radio Service ("CMRS") telecommunications service, Neustar does not possess the requisite authority to engage in the provision to the public of CMRS telecommunications services in any state or territory of the United States. According to Neustar, it has not been issued, nor has it applied for, any radio license or any similar authorization or approval issued by the FCC for the provision of CMRS telecommunications service. This is verified by a review of the licenses issued by the FCC through its Universal Licensing System ("ULS"), which is available at <http://wireless2.fcc.gov/UlsApp/UlsSearch/searchLicense.jsp>. A search of the FCC's ULS indicates that no license is held by Neustar.

In addition, I reviewed the FCC 499 List, which contains a current list of providers of any telecommunications service in any state or territory of the United States. Based on my review of the FCC 499 List as of September 30, 2012, December 31, 2012, and March 25, 2013, Neustar is not on the FCC 499 List as a provider of any telecommunications service in any state or territory of the United States, including CMRS or any form of cellular, PCS or other mobile service. Moreover, all providers of CMRS telecommunications service are required to file Form 499-A with the FCC, and as of the date hereof, according to Neustar, it has not filed Form 499-A with the FCC, nor is it required to do so.

Also in connection with CMRS telecommunications service, it should be noted that in its role as the NANPA and PA, Neustar is permitted to assign telephone numbers or central office codes only to entities that can, among other things, demonstrate that they have the requisite authority to provide service in the area in which they are seeking numbers or codes. Per guidelines established by the Industry Number Council, such authority for CMRS service providers can be demonstrated by a radio license or other similar document. Accordingly, Neustar is familiar with all of the ways in which the requisite authority to provide such services can be obtained and documented. According to Neustar, it does not possess, nor is it seeking, any such authority.

Third, in connection with interconnected Voice over Internet Protocol ("VOIP") service, Neustar does not qualify as a Class 1, Class 2 or Class 3 interconnected VOIP provider, as those classes of providers are defined in the *VQS*. A Class 1 VOIP provider is described as obtaining numbering resources directly from the NANPA and the PA. As the NANPA and PA, Neustar requires that a VOIP provider demonstrate evidence of an order from the FCC indicating that the provider is authorized to obtain numbering resources directly from the NANPA or PA. According to Neustar, the FCC has not issued any order authorizing Neustar to receive numbering resources directly from the NANPA or PA for the provision of VOIP services. The *VQS* indicates that Class 2 and Class 3 VOIP providers obtain numbering resources and Public Switched Telecommunications Network ("PTSN") connectivity through a Telecommunications Service Provider partner or through another interconnected VOIP provider, respectively. Such arrangements would require contractual agreements with Telecommunications Service Providers or with interconnected VOIP providers. According to Neustar, it has no such agreements with Telecommunications Service Providers or interconnected VOIP providers to obtain numbering



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resources or PSTN connectivity. In addition, all interconnected VOIP providers are required to file Form 499-A with the FCC, and as of the date hereof, according to Neustar, it has not filed Form 499-A with the FCC, nor is it required to do so.

**(1) b. Neustar is Not Owned By, and Does Not Own, Any  
Telecommunications Service Provider.**

It is my legal opinion that Neustar is not owned by, and does not own, any Telecommunications Service Provider. My legal opinion on this matter is based upon my review of: (1) lists of shareholders of Neustar stock during the period January, 2010 through March, 2013; (2) an organizational chart listing all Neustar-owned entities, subsidiaries and other holdings of Neustar as of March 25, 2013; (3) the FCC 499 List; (4) certain Neustar certifications since 2006, and (5) the 10 percent threshold definition of ownership set forth in paragraph (1) b. of section 3.4 of the *VQS*.

In connection with owners of Neustar stock, no person or entity has held more than 10 percent of the stock of Neustar during the period January, 2010 through March, 2013. I note that the largest single shareholder of Neustar stock during this period held 9.64 percent of Neustar stock. Thus, no Telecommunications Service Provider or any other entity qualifies as an owner of Neustar.

In connection with all Neustar-owned entities, subsidiaries and other holdings of Neustar as of March 25, 2013, none are on the FCC 499 List. The organizational chart listing each entity, subsidiary and other holding owned by Neustar is provided at **Tab 1**. Thus, Neustar does not own any entity that qualifies as a Telecommunications Service Provider.

I have also reviewed the Neustar Management Compliance Certifications executed in writing by the Chief Executive Officer of Neustar on a quarterly basis since 2006. These documents, submitted to auditors for neutrality review purposes, certify that Neustar has no actual knowledge of being owned or controlled (by virtue of a 5 percent or more interest) by any Telecommunications Service Provider, and has not acquired any equity interest in any Telecommunications Service Provider.<sup>3</sup>

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<sup>3</sup> The Neustar Management Compliance Certifications arose in response to the FCC's 2004 Order imposing certain conditions to ensure neutrality. *In the Matter of North American Numbering Plan Administration NeuStar, Inc. Request to Allow Certain Transactions Without Prior Commission Approval and to Transfer Ownership*, CC Docket No. 92-237, Order, 16922, para. 22 (2004). The Certifications also reference an exception to the ownership or control limit of five percent by any Telecommunications Service Provider or its affiliate to account for the prior ownership interest of Warburg Pincus. That ownership interest ended on or before Neustar's initial public offering in 2005, and thus this exception has had no application to the Certifications after that date.



**(1) c. Neustar is Not an Affiliate, by Common Ownership or Otherwise, of a Telecommunications Service Provider.**

It is my legal opinion that Neustar is not an affiliate, by common ownership or otherwise, of a Telecommunications Service Provider. My legal opinion on this matter is based upon: (1) lists of shareholders of Neustar stock during the period January, 2010 through March, 2013; (2) an organizational chart listing all Neustar-owned entities, subsidiaries and other holdings of Neustar as of March 25, 2013; (3) the FCC 499 List; (4) certain Neustar certifications since 2006, and (5) the 10 percent threshold definition of affiliation set forth in paragraph (1) c. of section 3.4 of the *VQS*.

In connection with entities that have an ownership interest in Neustar, by virtue of Neustar's current status as a publicly traded company, the only existing ownership interests are in the stock of the corporation. I note that the corporate form of Neustar is a Delaware corporation, and thus there is no partnership interest, joint venture participation, or limited liability company member interest in Neustar. No person or entity has held more than 10 percent of the stock of Neustar during the period January, 2010 through March, 2013. I note that the single largest shareholder of Neustar stock during this period held 9.64 percent of Neustar stock. Thus, no Telecommunications Service Provider or any other entity qualifies as a Neustar affiliate by virtue of holding an ownership interest in Neustar.

In connection with ownership interests held by Neustar, these are comprised entirely of subsidiaries owned by Neustar, as set forth on the Neustar organizational chart provided at **Tab 1**. All entities qualifying as affiliates but one CONFIDENTIAL are 100-percent owned by Neustar. None of these entities, including CONFIDENTIAL, is on the FCC 499 List, and thus, none are Telecommunications Service Providers. In addition, no Telecommunications Service Provider owns 10% or more of CONFIDENTIAL, so it is not a Telecommunications Service Provider affiliate.

In connection with voting power on any matter involving the actions of Neustar, voting power of shareholders is determined exclusively by stock ownership. Since no shareholder held more than 10 percent of Neustar's stock during the period January, 2010 through March, 2013, no shareholder qualifies as an affiliate by virtue of voting power.

In connection with the power to direct or cause the direction of management and policies of Neustar, only the shareholders, directors and management of Neustar may have such power. To my Actual Knowledge, and according to Neustar, there are no contracts, agreements, voting rights, or other arrangements whereby any entity, including any Telecommunications Service Provider, has the power to direct the management or policies of Neustar.

I have also reviewed the Neustar Management Compliance Certifications executed in writing by the Chief Executive Officer of Neustar on a quarterly basis since 2006. These documents, submitted to auditors for neutrality review purposes, certify that Neustar has no



actual knowledge of being owned or controlled (by virtue of a 5 percent or more interest) by any Telecommunications Service Provider, or of possession by any Telecommunications Service Provider of the power to direct the management and policies of Neustar.<sup>4</sup>

**(2) Neustar or Any Affiliate of Neustar Has Not Issued a Majority of Its Debt To, Nor Derived a Majority of Its Revenues (Not Including the NPAC/SMS) From, Any Telecommunications Service Provider.**

Debt. It is my legal opinion that Neustar has not issued a majority of its debt to any Telecommunications Service Provider. My legal opinion on this matter is based upon my review of the following: (1) lists of all entities to which Neustar has issued debt as of September 30, 2012, January 4, 2013, January 22, 2013, and March 25, 2013, and (2) the FCC 499 List. My review of the FCC 499 List was undertaken in order to determine if any of the entities to which Neustar has issued debt (as of the four dates indicated above) were on the FCC 499 List.

I note that the lists of all entities to which Neustar has issued debt included both the holders of Neustar's debt, as well as the parties to all of Neustar's capital leases and letters of credit. These lists included stocks, bonds, securities, notes, loans, capital leases, letters of credit, and any other instrument of indebtedness, of any duration. Based upon my review, I found that Neustar has not issued a majority (greater than 50%) of its debt to a Telecommunications Service Provider, and moreover, none of Neustar's debt has been issued to a Telecommunications Service Provider as of the four dates indicated.

Revenues. It is my legal opinion that Neustar has not derived a majority of its revenues (not including NPAC/SMS revenues) from any Telecommunications Service Provider. My legal opinion on this matter is based upon my review of Neustar's 2012 revenue data listing the sources and amounts of all Neustar revenues received. In an abundance of caution, I elected to investigate further by adding to my review two additional years of revenue data. Thus, my review covers Neustar's revenue during a look-back period of calendar years 2010 – 2012, as further described below.

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<sup>4</sup> The Neustar Management Compliance Certifications arose in response to the FCC's 2004 Order imposing certain conditions to ensure neutrality. *In the Matter of North American Numbering Plan Administration NeuStar, Inc. Request to Allow Certain Transactions Without Prior Commission Approval and to Transfer Ownership*, CC Docket No. 92-237, Order, 16922, para. 22 (2004). The Certifications also reference an exception to the ownership or control limit of five percent by any Telecommunications Service Provider or its affiliate to account for the prior ownership interest of Warburg Pincus. That ownership interest ended on or before Neustar's initial public offering in 2005, and thus this exception has had no application to the Certifications after that date.



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The revenue data for 2012 indicates that Neustar received non-NPAC/SMS revenue from more than [REDACTED] individual customers. The single largest of these customers provided [REDACTED] percent of Neustar's total non-NPAC/SMS revenue. 99.88 percent of these customers each provided less than 1 percent of Neustar's total non-NPAC/SMS revenues in 2012.

The revenue data for 2011 indicates that Neustar received non-NPAC/SMS revenue from more than [REDACTED] individual customers. The single largest of these customers provided [REDACTED] percent of Neustar's total non-NPAC/SMS revenue. 99.82 percent of these customers each provided less than 1 percent of Neustar's total non-NPAC/SMS revenues in 2011.

The revenue data for 2010 indicates that Neustar received non-NPAC/SMS revenue from more than [REDACTED] individual customers. The single largest of these customers provided [REDACTED] percent of Neustar's total non-NPAC/SMS revenue. 99.88 percent of these customers each provided less than 1 percent of Neustar's total non-NPAC/SMS revenues in 2010.

I note that my review of non-NPAC/SMS revenue is prompted by the express language of paragraph (2) in Section 3.4 of the *VQS* that specifically excludes NPAC/SMS revenues. I elected to review Neustar's NPAC/SMS revenues, as well. The broad dispersal of sources of non-NPAC/SMS revenue also exists for NPAC/SMS revenue. In 2012, 99.61 percent of customers each provided less than 1 percent of Neustar's total NPAC/SMS revenues; in 2011, 99.58 percent each provided less than 1 percent; and in 2010, 99.63 percent each provided less than 1 percent. During this 3-year period, the largest NPAC/SMS revenue source from a single customer accounted for [REDACTED] percent of Neustar's annual NPAC/SMS revenue.

Based on my review of all Neustar revenue sources during the past three calendar years, no one revenue source provided a majority of Neustar's revenues. Accordingly, Neustar cannot have derived a majority of its revenues from any Telecommunications Service Provider, or any other entity.

Affiliates. Neustar's "affiliates," as that term is defined in Section 3.4 of the *VQS*, are comprised of subsidiaries of Neustar, all of which are 100% owned by Neustar. I note that by this same definition, persons or entities that own a percentage of the capital stock of Neustar in excess of 10% of the total outstanding ownership interests in that stock would also qualify as an affiliate of Neustar. During the period January, 2010 through March, 2013, there has been no entity that has owned more than 10% of Neustar's outstanding stock. Thus, no entity qualifies as an affiliate of Neustar by virtue of stock ownership. Accordingly, the only affiliates of Neustar are its 100%-owned subsidiaries.

In connection with the issuance of debt, based upon my review of Neustar's most recent Form 8-K filing with the U.S. Securities and Exchange Commission dated January 22, 2013, all of Neustar's debt is issued by Neustar. Although none of Neustar's 100%-owned subsidiaries have issued debt, some of these subsidiaries serve as guarantors of the debt issued by Neustar.



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In connection with the derivation of revenues, based upon my review of Neustar subsidiary revenue data listing the sources and amounts of all Neustar subsidiary revenues received during 2010-2012, none of Neustar's affiliates (the 100%-owned subsidiaries) have derived a majority of revenues from any Telecommunications Service Provider.

**(3) Neustar is Not Subject to Undue Influence by Parties With a Vested Interest in the Outcome of Numbering Administration and Activities, and Neustar is Not Involved in a Contractual or Other Arrangement That Would Impair its Ability to Administer the NPAC/SMS Fairly and Impartially as an LNPA or to Implement the Schedule Set Forth in the IASTA SmartSource SRM Tool, Called the FoNPAC Timeline.**

It is my legal opinion that Neustar is not subject to undue influence by parties with a vested interest in the outcome of numbering administration and activities. It is my further legal opinion that Neustar is not involved in a contractual or other arrangement that would impair its ability to administer the NPAC/SMS fairly and impartially as an LNPA or to implement the schedule for the NPAC/SMS deployment. My legal opinion on these matters is based upon an array of neutrality requirements and circumstances that already apply to Neustar or conform to Neustar's practices as of the date hereof.

By virtue of Neustar's role as the current LNPA, Neustar is subject to the FCC's definition of the LNPA at 47 CFR 52.21(k): "The term local number portability administrator (LNPA) means an independent, non-governmental entity, not aligned with any particular telecommunications industry segment ...." In order to maintain its role as the LNPA, Neustar has complied with this definitional mandate since the inception of the LNPA in 2000. Based on my review of audit reports, there is no finding or inference in either the Neutrality Audits since 2000 or the LNPA Neutrality Audits since 2002<sup>5</sup> that indicates any non-compliance with this definitional mandate. Accordingly, I conclude that Neustar has not been, and is not being, unduly influenced by parties with a vested interest in the outcome of numbering administration.

In my view, whether Neustar is subject to such undue influence is best assessed by an investigation of recent revenue. I have reviewed a list of all of Neustar's revenue sources during the period 2010-2012, including NPAC/SMS revenues and non-NPAC/SMS revenues. Based on my review, I found that Neustar derives its revenue from an array of segments of the telecommunications industry and other sources, including, but not limited to, wireline carriers, wireless carriers, cable service providers, internet registry/registrar companies, advertisers and other commercial enterprises. During this period, Neustar's largest non-NPAC/SMS revenue source from a single customer accounted for approximately 10 percent of its annual non-NPAC/SMS revenue, and its largest NPAC/SMS revenue source from a single customer accounted for approximately 10 percent of

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<sup>5</sup> The Neutrality Audits and the LNPA Neutrality Audits are fully described in Section (7) of this Legal Opinion.



its annual NPAC/SMS revenue. In this same 3-year period, more than 99 percent of Neustar's non-NPAC/SMS customers each accounted for less than one percent of Neustar's total non-NPAC/SMS revenues, and similarly, more than 99 percent of Neustar's NPAC/SMS customers each accounted for less than one percent of Neustar's total NPAC/SMS revenues.

This broad dispersal of revenue sources, together with the absence of concentration of or reliance upon any single source of revenue, leads me to conclude that there is no undue influence upon Neustar, and Neustar is not subject to undue influence from any one segment of the telecommunications industry or any one Telecommunications Service Provider.

In assessing whether Neustar is subject to undue influence by parties with a vested interest in numbering administration, I have reviewed Neustar's contracts with its major customers. Significantly, I find no contract or other legal obligation for Neustar to operate any Telecommunications Service Provider's network, or to be involved in numbering administration on behalf of any entity. In response to my data request to Neustar made in connection with this Legal Opinion, Neustar confirmed that no such contract or other legal obligation exists as to the operation of any such network, or as to involvement in numbering administration on behalf of any entity. Thus, the ordinary influence that may be expected to arise from a Telecommunications Service Provider whose network was being operated would have no application or relevance to Neustar, as a result of the absence of such a practice by Neustar. A similar inference may arise if Neustar was involved in numbering administration of behalf of any entity, but here again, this has no application or relevance to Neustar, because Neustar has no such involvement.<sup>6</sup>

The Neustar Code of Conduct, which governs Neustar's conduct as the current LNPA, contains a number of requirements that guard against undue influence by parties with a vested interest in the outcome of numbering administration and activities. For example, Code of Conduct Item 7 states that, "No member of Neustar's board will simultaneously serve on the board of a telecommunications service provider." Based upon my review of quarterly certifications since 2002 of all Neustar Directors and the FCC 499 List, no Neustar Director is a

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<sup>6</sup> My conclusions here are based on the following definitional assumptions: (1) a "Telecommunications Service Provider" means an entity that either possesses authority to engage in the provision to the public of facilities-based wireline local exchange or CMRS in the U.S., or is one of either a Class 1, Class 2 or Class 3 interconnected VoIP provider; (2) a "network" is a wireline or wireless system that transmits telecommunications from one point to another; (3) "operating" a network means to cause the network to function, including construction and maintenance of the facilities over which telecommunications or VoIP traffic is transmitted; and (4) "numbering administration" means the management of a telephone number ("TN") inventory, such as allocating TNs to users, performing NRUF reporting, applying for numbering resources, and representing a Telecommunications Service Provider on industry numbering panels (and does not include providing an entity with the tools so that the entity can manage its own numbering inventory).



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member of a board of directors of any Telecommunications Service Provider, and no Neustar Director has been a member of such a board during the period 2002-2013.

By way of further example, Code of Conduct Item 6 states that, "Warburg Pincus will not control more than 40 percent of Neustar's Board." Based upon my review of quarterly certifications since 2002 of all Neustar Directors, neither Warburg Pincus, nor any single shareholder or group of shareholders treated as a single entity under Section 13(d)(3) of the Securities and Exchange Act of 1934, controls or has controlled more than 40 percent of Neustar's Board.

#### **Other VOS Neutrality Requirements**

##### **(4) Neustar's Ability to Cure Deficiencies in Neutrality**

It is my legal opinion that Neustar has implemented substantial policies and procedures that will cure any deficiencies in neutrality. My legal opinion is based on the following.

If Neustar is awarded the LNPA contract, it is reasonable to assume there will be no deficiencies in neutrality at the time of the award. This is because as the current LNPA, Neustar is required to be neutral and free of deficiencies in neutrality, by virtue of an array of neutrality requirements already applicable at the time of any contract award, including but not limited to, the Neustar Code of Conduct, the Neustar Neutrality Procedures, the practices and policies of the Neustar Neutrality Officer and Neutrality Committee, and the periodic neutrality audits and LNPA neutrality audits to which Neustar is subjected.<sup>7</sup> If at any time subsequent to the award a deficiency in neutrality were to develop, Neustar will have in place substantially these same policies and procedures that will allow Neustar to identify and resolve any deficiency.

Neustar's record as the LNPA since 2000 demonstrates how it will cure any deficiency in neutrality, if in the future Neustar continues to serve as the LNPA as a result of being awarded the LNPA contract. Two examples during Neustar's tenure as the LNPA since 2000, described below, aptly illustrate this point. Both examples were first disclosed by Neustar in the course of the LNPA Neutrality Audits I have conducted since 2002 and which were reported in my audit reports (and thus were not disclosed just in connection with the preparation of this Legal Opinion).

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<sup>7</sup> The Neustar Code of Conduct, the Neustar Neutrality Compliance Procedures, the Neustar Neutrality Officer, the Neustar Neutrality Committee, and the periodic audits are all described in greater detail in sections (6) and (7) of this Legal Opinion.



### 2011 Neustar Stock Ownership Incident

On April 14, 2011, Neustar's Vice President of Tax received a notice of the availability of proxy materials for the annual meeting of CONFIDENTIAL, a Telecommunications Service Provider ("TSP"). According to a CONFIDENTIAL Direct Registration Account Statement sent to Neustar with the aforementioned notice, 100 shares, with a market value of \$2.32 per share or aggregate value of \$232 (as of May 27, 2011), were owned by Neustar but held by a stock transfer agent. Immediately upon receipt of this information, Neustar's Vice President of Tax notified Neustar's Neutrality Officer, who began an investigation into how Neustar acquired the stock and possible means of its disposal. On May 16, 2011, Neustar notified the FCC in writing of the foregoing and reported that because Neustar was not the holder of the stock, it would first need to acquire control of the shares from the transfer agent. On June 2, 2011, Neustar reported in writing to the FCC that on May 25, 2011 it had acquired control of the shares and immediately transferred all of the shares to charity (American Red Cross). According to Neustar and as stated in its written correspondence to the FCC, although Neustar could not confirm precisely how it came to own the shares, Neustar believes that the shares originated as shares of CONFIDENTIAL prior to CONFIDENTIAL acquisition by CONFIDENTIAL, and that a company acquired by Neustar held CONFIDENTIAL shares but did not inform Neustar at the time of acquisition, or that CONFIDENTIAL allocated the shares to Neustar as payment for a debt, even though Neustar routinely declines all such offers.

The policies and procedures that brought about a cure of any deficiency in neutrality that may have arisen from this 2011 stock ownership incident included the neutrality training of Neustar employees that led to the reporting of this incident to the Neutrality Officer; the training and capacity of the Neutrality Officer that led to immediate investigation of the incident and prevention of any actual Neustar Code of Conduct neutrality violation (ownership of the stock by a Neustar employee); the timely and frequent reporting of the incident to the FCC; the full and effective investigation of the incident which led to the implementation of Neustar safeguards to prevent a future similar occurrence in the event of an acquisition of another company by Neustar; and the reporting of the incident to neutrality auditors and governmental authorities through the issuance of the quarterly Neustar Report of Management.

### 2008 Shareholder Stock Ownership Incident

Following a letter sent by Neustar on August 27, 2008, to one of its greater-than-5-percent shareholders, that shareholder disclosed to Neustar that it had acquired more than 10 percent of CONFIDENTIAL, a TSP. The disclosure was made by Steinberg Asset Management, LLC ("Steinberg") pursuant to a periodic certification required by Neustar of all shareholders holding more than 5 percent of Neustar stock in connection with the LNPA Neutrality Audit. The disclosure certified that Steinberg had become a TSP affiliate in August of 2008 as a result of its acquisition, through a series of share purchases, of approximately 10.27 percent of the shares of CONFIDENTIAL.



Based on its investigation, Neustar discovered that Steinberg was an SEC-registered investment adviser that acquires securities of companies in the ordinary course of its advisory business where, in all cases, such acquisitions are not undertaken for the purpose of influencing control over the issuer of securities. Steinberg then certified that upon learning of the FCC requirements applicable to Neustar, Steinberg immediately established and implemented a divestiture plan to reduce the shares of <sup>CONFIDENTIAL</sup> under its control to less than 10% by the close of trading on August 30, 2008. Internal controls were also established to prevent Steinberg from inadvertently taking a 10% or greater position in <sup>CONFIDENTIAL</sup> or any other TSP while Steinberg is also a 5% or greater shareholder in Neustar. Steinberg identified no other TSP holdings that currently or previously were at or above the 10% threshold.

The policies and procedures that brought about a cure of any deficiency in neutrality that may have arisen from this 2008 stock ownership incident included the certification requirements imposed by Neustar on shareholders owning more than 5 percent of Neustar stock; the training and capacity of the Neutrality Officer that led to Neustar's immediate investigation of the incident and the eventual cure of the incident and prevention of future incidents; and the reporting of the incident to neutrality auditors through the issuance of the quarterly Neustar Report of Management.

#### **(5) The Identity and Corporate Affiliations of All Sub-Contractors**

It is my legal opinion that Neustar has complied with all applicable requirements concerning the disclosure of all sub-contractors as required by the *RFP Documents*, for the reasons explained below.

According to Neustar, during the entire next term of the NPAC/SMS, Neustar will not engage or include any "sub-contractor" in providing any service required by the *RFP Documents*. Neustar assigns the ordinary definition to the term "sub-contractor" in the context of the *RFP Documents*, that is, a contractor engaged to perform all or part of the obligations set forth in Neustar's NPAC/SMS contract. No contractor or any other entity will be engaged in the provision of any good or service required by the *RFP Documents* for the next NPAC/SMS.

However, Neustar does intend to engage various entities, such as third-party software and hardware vendors, to provide Neustar with goods and services needed for Neustar to assemble, deliver, operate, and support the NPAC/SMS. These vendors will function as independent contractors engaged by Neustar. Significantly, Neustar will not delegate to any such contractor any of Neustar's responsibility for providing the services required by the *RFP Documents* for the next NPAC/SMS. In other words, these contractors, although engaged by Neustar to deliver goods and services to Neustar, will stand behind Neustar and have no role in the actual provision of any NPAC/SMS service. Only Neustar will be engaged in the actual provision of NPAC/SMS services.



Because no contractor will actually be engaged in the provision of any service required by the *RFP Documents* for the next NPAC/SMS, none will be in a position to interact with users of the NPAC/SMS ("Users"). Thus, no contractor will be in a position to treat Users differently from one another, or otherwise bring about disparate or discriminatory treatment of Users. Also, no contractor will have access to a User's data from the NPAC/SMS. In addition, no contractor will be in communication with any User. According to Neustar, these limitations upon all contractors will be in place throughout the term of the next NPAC/SMS.

Notwithstanding my finding that Neustar will not engage or include any contractor in providing the services required by the *RFP Documents*, I elected to review a list of the 38 vendors (and type of services to be provided by each vendor) that Neustar intends to engage, under the terms and conditions described above.

Section 3.4 of the *VQS* notes that all Sub-Contractors must at all times be Neutral Third Parties. In applying the criteria for Neutral Third Parties set forth in paragraphs 1-3 of Section 3.4 of the *VQS* to the 38 vendors to be engaged by Neustar, I make the following findings:

1) based upon my review of the FCC 499 List, none of the 38 vendors are Telecommunications Service Providers;

2) as to the Neutral Third Party criteria set forth in paragraphs 1b, 1c, 2 and 3 of Section 3.4 of the *VQS*, I have not conducted any investigation as to all 38 of the vendors. However, to my Actual Knowledge, none of the 38 vendors: (a) are owned by, and none own, any Telecommunications Service Provider (as ownership is defined by Section 3.4 of the *VQS*); (b) are affiliates, by common ownership or otherwise, of a Telecommunications Service Provider (as affiliation is defined in Section 3.4 of the *VQS*); (c) has issued a majority of its debt to, nor derived a majority of its revenues from, any Telecommunications Service Provider (nor has any affiliate of the 38 vendors); (d) are subject to undue influence by parties with a vested interest in the outcome of numbering administration and activities, or are involved in a contractual or other arrangement that would impair its ability to administer the NPAC/SMS fairly and impartially as an LNPA or to implement the schedule set forth in the IASTA SmartSource SRM Tool, called the FoNPAC Timeline; and

3) to the extent that any of the 38 vendors did actually trigger any of the criteria set forth in paragraphs 1b, 1c, 2 and 3 of Section 3.4 of the *VQS*, there would be no impairment of neutrality or Neutral Third Party status. This is because, as explained above, each of the 38 vendors stands behind Neustar and is not in any way acting as an actual provider of the services required by the *RFP Documents* for the next NPAC/SMS. Only Neustar will be providing those services. Thus, there is no impairment of the ability of the LNPA to be at all times a Neutral Third Party, and no impairment of evenhanded, impartial and nondiscriminatory access to the NPAC/SMS for all qualified Users.



(6) Contractual Relationships, Arrangements and Other Factors

It is my legal opinion that: (1) there are a number of contractual relationships, arrangements and other factors that would enhance the ability of Neustar and any of its sub-contractors to ensure that the LNPA is at all times a "Neutral Third Party" (as that term is defined in the *VQS*), and (2) access to the NPAC/SMS for all qualified users will at all times be evenhanded, impartial and nondiscriminatory. It is my further legal opinion that there are no contractual relationships, arrangements or other factors that would impair Neustar's ability to ensure that the LNPA is at all times a Neutral Third Party. My legal opinion is based on the following:

(a) **Master Agreements** – There are seven regional contracts in effect as of the date hereof, known as the Contractor Services for NPAC/SMS ("Master Agreements"), by and between Neustar and the NAPM LLC for the creation and operation of the current NPAC/SMS. Neustar is a party to each of the Master Agreements and, as the current creator and operator of the NPAC/SMS performing as the current LNPA, is subject to all of the requirements of the Master Contracts. Article 23 of the Master Contracts requires Neustar to be a Neutral Third Party.<sup>8</sup> Under the Master Agreements, Neustar is also required to treat all users of the NPAC/SMS in an evenhanded, impartial and nondiscriminatory manner (see, for example, Articles 6-Pricing; 8-Obligations of Customer; 10-Problem Resolution; 15-Confidential Information). Neustar has been subject to the Master Agreements continuously since 1997, and thus has extensive experience with achieving and maintaining continuous compliance with the Master Agreement requirements for a Neutral Third Party, and fair treatment of Users.

(b) **User Agreements** – Neustar is currently a party to NPAC/SMS User Agreements ("User Agreements") with each user of the NPAC/SMS. The User Agreements are legal contracts governing the terms, rates and conditions for the use of the NPAC/SMS. Based upon my review of a sampling of User Agreements previously or currently in effect in each of the seven regions of the United States in which Master Agreements have been executed, except for non-substantive wording differences in the language, headings, "WHEREAS" clauses and statements of intent, the User Agreements are identical. Under the terms of all User Agreements, Neustar is required to be a Neutral Third Party.<sup>9</sup> Because the User Agreements are effectively

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<sup>8</sup> The Master Agreements define "Neutral Third Party" as an entity which is not: (a) a telecommunications service provider, (b) owned by, or does not own, any telecommunications service provider (excluding ownership interests of five percent or less), and (c) affiliated, by common ownerships or otherwise, with a telecommunications service provider. This definition is in harmony and does not conflict with the definition set forth in the *VQS*, but the *VQS* includes additional criteria addressing debt, revenues, influence, and other qualitative commitments to neutrality set forth in Section 3.4.

<sup>9</sup> Article 2 of the User Agreements incorporates the terms of the Master Agreements into the User Agreements, and makes the Master Agreement terms governing. The term "Neutral Third Party" is defined as explained in footnote 8. infra.



identical and have been executed with all Users of the NPAC/SMS, each User is receiving substantially identical terms, rates and conditions for NPAC/SMS services. Accordingly, the User Agreements, to which Neustar is a party, ensure that each User of the NPAC/SMS is being treated in an evenhanded, impartial and nondiscriminatory manner. Neustar has contracted with all NPAC/SMS Users and has been subject to the User Agreements for various time intervals since the late 1990s, and thus has extensive experience with achieving and maintaining continuous compliance with the User Agreement requirements for a Neutral Third Party, and the fair treatment of Users.

(c) **Corporate Existence** – Neustar corporate existence is explicitly subject to neutrality. Article IV of Neustar’s Restated Certificate of Incorporation, provided at **Tab 2**, contains ownership restrictions expressly prohibiting ownership of certain amounts of Neustar stock by telecommunication service providers and their affiliates. These same ownership restrictions are incorporated in the actual terms stated in Neustar’s Class A and Class B Common Stock Certificates, provided at **Tab 3**.

(d) **Neutrality Officer** – Neustar has created and maintains the position of “Neutrality Officer,” which serves as the Company’s single point of contact with respect to Neustar’s neutrality compliance. The Neutrality Officer reports, with respect to his or her neutrality functions, directly to the Neutrality Committee of the Neustar Board of Directors. Among other duties, the Neutrality Officer conducts and closely supervises annual neutrality compliance training for all members of the Neustar Board of Directors, all full-time and part-time employees, and independent contractors that the Neutrality Officer has designated, in his or her discretion, as persons directly involved in Neustar’s day-to-day operations as the LNPA.

On a quarterly basis, the Neutrality Officer certifies compliance with an array of neutrality requirements that apply in connection with Neustar’s current role as the LNPA. These include: (a) maintaining all new hire, quarterly and annual neutrality certifications by all applicable Neustar employees, board members and designated contractors; (b) providing to each Neustar employee, board member and designated contractor the list of all telecommunications service providers produced by the FCC; (c) ensuring that the Neustar Code of Conduct is posted at all Neustar locations; (d) maintaining records of any written complaint submitted to Neustar alleging discrimination or favoritism by Neustar in any of its LNPA operations or services; (e) reporting whether there were any such complaints or and instances of non-conformance with the Neustar Neutrality Procedures; (f) confirming and certifying that there have been no violations of the Neustar Code of Conduct; and (g) confirming and certifying that Neustar is in compliance with its Master Agreement obligations regarding Intermodal Ported Telephone Number Identification Service and Local Number Portability Enhanced Analytical Platform (“LEAP”) Service, in connection with its LNPA service obligations.

I found that the Neustar Neutrality Officer has successfully performed these quarterly activities continuously since 2003, except that the Intermodal Ported Telephone Number Identification Service and LEAP Service certifications began at the inception of these services in



2004, and 2007, respectively. This finding is based upon our review of quarterly written certifications made by the Neutrality Officer as to each of these activities, and our review of each activity conducted in the course of the 10 LNPA Neutrality Audits, described more fully below, conducted during 2002 – 2012.

(e) **Neutrality Committee** – The Neustar Board of Directors has created and maintains a Neutrality Committee, comprised of the Chief Executive Officer of Neustar (if he or she is a member of the Board, or if not, the Chairman of the Board) and two unaffiliated independent directors. The Committee was one of three committees established by the Neustar Board of Directors at the time of Neustar’s inception and has operated continuously since January of 2000 (resolution enclosed herewith at **Tab 4**).

All of these contractual relationships, arrangements and other factors establish a documented record of long-term, uninterrupted, and full compliance with all applicable neutrality requirements that have applied to Neustar in connection with its role during 2002 to the present as the LNPA. Based upon my review, there are no contracts or other agreements that conflict with or otherwise contradict the terms of these aforementioned contractual relationships, arrangements and other factors.

#### (7) **Policies and Procedures Ensuring Neutrality**

It is my legal opinion that Neustar has demonstrated an understanding and willingness to implement policies and procedures that will ensure satisfaction of the neutrality criteria and requirements set forth in the *RFP Documents*. My legal opinion is based on the following:

(a) **Neutrality Audits** – Pursuant to FCC Order,<sup>10</sup> Neustar has submitted to quarterly neutrality audits conducted by an outside neutral third party auditor. Fifty (50) neutrality audits have been conducted since 2000. The neutrality audits have investigated the neutrality of Neustar in its role as the LNPA, together with two other roles as the North American Numbering Plan Administrator (“NANPA”) and Pooling Administrator (“PA”). The neutrality audits are based upon the Neustar Neutrality Procedures, which provide a plan for the implementation of and compliance with the Neustar Code of Conduct and the neutrality regulations of the NANPA and PA.

In the course of each audit, Neustar is required to provide, among other documents: (a) neutrality compliance certifications from each employee, board member and executive officer; (b) a management assertion of neutrality letter; (c) new hire certifications; (d) the results of the annual neutrality tests given to every Neustar employee; (e) local number portability

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<sup>10</sup> *Request of Lockheed Martin Corporation and Warburg, Pincus & Co. for Review of the Transfer of Lockheed Martin Communications Industry Services Bureau, 14 FCC Rcd. 19792 (1999).*



enhanced analytical platform service agreements and NPAC/SMS end user service agreements, (f) neutrality certifications from each five percent or greater shareholder of Neustar's outstanding stock, (g) notices to the FCC of any organizational and board changes, and (h) Neustar debt and revenue information. The auditor also examines access to the NPAC/SMS and its security procedures.

The auditor then conducts extensive internal review of the audit proceedings, findings and reports to ensure all appropriate audit procedures were followed. The auditor's report is reviewed by Neustar's Board of Directors Neutrality Audit Committee and takes corrective action, if necessitated by the audit results. The full Neustar Board of Directors reviews the audit results for independence, integrity, accuracy and irregularities, and certifies its acceptance of the audit report by attesting and delivering it to the FCC's Wireline Competition Bureau, the NANC and the NAPM LLC.

In all 50 prior neutrality audits, Neustar has been determined to have complied with the Neustar Neutrality Procedures, the FCC's Neutrality Regulations, and the Neustar Code of Conduct.<sup>11</sup>

**(b) LNPA Neutrality Audits** – Neustar has submitted to periodic reviews of its neutrality in the operation of the NPAC/SMS, on a semi-annual, annual or biennial basis, since July 1, 2002. The LNPA Neutrality Audits have been conducted separate from the quarterly Neutrality Audits described in (1) above, and by a different outside neutral third party auditor.<sup>12</sup> The LNPA Neutrality Audit results in the issuance of a final report to both Neustar and the NAPM LLC containing: (a) legal opinions on Neustar's LNPA-related compliance with Item Nos. 5-8 of the Neustar Code of Conduct, and (b) a series of factual judgments on: (i) Item Nos. 1-4 of the Neustar Code of Conduct, and (ii) certain further neutrality obligations agreed upon by Neustar and NAPM LLC. The Neustar Code of Conduct and the further neutrality obligations are provided at **Tab 5**.

The LNPA Neutrality Audits were expanded in scope in 2004 and 2007 to include neutrality reviews of Intermodal Ported Telephone Number Identification Service and LEAP Service, respectively. These expansions were required by Amendment Nos. 48 and 53 to the Master Agreements, respectively.

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<sup>11</sup> Each of the audit reports asserts that it is solely for the information and use of the Board of Directors and management of Neustar and the FCC, and is not intended to be used for any other purpose. The reports and their conclusions are noted in this Legal Opinion for informational purposes. I note that the reports are a matter of public record and their distribution is not limited.

<sup>12</sup> As stated in the introductory section of this Legal Opinion, the auditor conducting the LNPA neutrality audits since 2002 has been the law firm of DLA Piper LLP (US).



There have been ten (10) LNPA Neutrality Audits conducted by the outside neutral third party auditor since July 1, 2002. In all such Audits, Neustar has been determined to have complied with the Neustar Code of Conduct and the further neutrality obligations.

(c) **New User Evaluator Process** – New User Evaluator (“NUE”) audits have been performed by TMNG since 2009 on both a periodic and ad-hoc basis. Under this process, first introduced by Amendment No. 62 to the Master Agreements, Neustar no longer evaluates the initial, intended use of User Data proposed by applicants that are attempting to become NPAC/SMS Users if those applicants self-identify as providers of telecommunications-related services, which use is now reviewed by the NUE. Also, all services (including those resulting from acquisitions and mergers, as well as those modifications to existing services) that depend on access to the NPAC/SMS or use of User Data from the NPAC/SMS are reviewed by the NUE for compliance with certain requirements, e.g., whether Neustar’s use of User Data constitutes a “permitted use,” and whether Neustar as User is accessing the same User Data as other Users.

(d) **Neustar Neutrality Compliance Policies and Procedures** – In connection with its current role as the LNPA, NANPA and PA, Neustar has initiated and implemented an array of policies and procedures in a comprehensive program known as the Neustar Neutrality Compliance Program. This is designed to achieve and maintain all applicable neutrality requirements in Neustar’s three roles. These policies and procedures include the following:

- Neustar Neutrality Compliance Procedures
- Neustar Neutrality Compliance Program Methods & Procedures
- Neustar Neutrality Compliance Training (for new employees and annually for existing employees)
- New Employee Neutrality Compliance Certification (for new employees and quarterly for existing employees)

Based upon my review of these policies and procedures, the Neustar Neutrality Compliance Program was implemented in 2000 and has been in place and implemented continuously since its inception. The Program contains such elements as new hire orientation, annual neutrality compliance training for all Neustar employees, and quarterly neutrality certifications for Neustar board members, designated contractors and employees. In connection with the quarterly neutrality certifications, it is notable that Neustar management or employees certify on a quarterly basis the following: (a) that Neustar is neutral (Neustar Report of Management on Compliance); (b) that Neustar has performed LNPA services on a nondiscriminatory basis, safeguarded LNPA databases and other proprietary information, did not issue a majority of its debt to, or derived a majority of its revenue from, any single Telecommunications Service Provider, and that no Telecommunications Service Provider owned or controlled a ten percent or greater equity or voting interest in Neustar or possessed the power



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to direct the management and policies of Neustar (Neustar Management Compliance Certification); (c) that there were no complaints submitted to Neustar alleging discrimination by Neustar and that the Neustar Code of Conduct is appropriately posted in all Neustar offices, (Neustar Neutrality Officer Compliance Certification); and (d) that the Neustar Code of Conduct has been complied with by each executive officer member of Neustar (Neustar Executive Officer Certification). All these certifications have been made quarterly and continuously since 2000, except that the Neustar Executive Officer Certifications began in 2006.

(e) **Neustar Code of Conduct and Related Neutrality Obligations** – In connection with its current role as the LNPA, Neustar abides by a Code of Conduct, together with a set of further neutrality obligations agreed to by Neustar and the NAPM LLC. The Code of Conduct arose from the FCC's Order in CC Docket No. 92-237 and NSD File No. 98-151, FCC 99-346, released on November 17, 1999. The further neutrality obligations arose as a result of negotiations between the predecessors of NAPM LLC and Neustar that resulted in a letter of agreement between the parties on or about November 21, 2002. Since July 1, 2002, Neustar has been evaluated on its compliance, and has been found to have complied, with the Code of Conduct and the further neutrality obligations in the 10 LNPA Neutrality Audits conducted by the outside neutral third party auditor. The neutrality requirements set forth in the Code of Conduct and the further neutrality obligations are provided at **Tab 5**.<sup>13</sup>

All of these compliance policies and procedures establish a documented record of long-term, uninterrupted, and full compliance with all applicable neutrality requirements that have applied to Neustar in connection with its role as the current LNPA.

\* \* \* \* \*

I hereby authorize and consent to the reliance upon this Legal Opinion by the FCC, the NAPM LLC and the FoNPAC Subcommittee for purposes of evaluating the neutrality of Neustar pursuant to the *VQS*. This Legal Opinion may not be relied upon, or quoted in whole or in part, or otherwise referred to in any public forum or document, by any other entity or person for any purpose without the prior mutual consent of the FCC, the NAPM LLC and the FoNPAC Subcommittee.

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<sup>13</sup> Pursuant to agreement between Neustar and NAPM LLC, since 2002 Neustar has been evaluated on Items 1-8 in the Code of Conduct, and at least Items 1, 3 and 7 of Exhibit A (the further neutrality obligations), in the LNPA Neutrality Audits.



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This Legal Opinion is given as of the date hereof, and I expressly disavow any responsibility to advise you of any changes hereto that may be necessary or advisable as the result of information coming to my attention hereafter.

Very truly yours,

A handwritten signature in dark ink, appearing to read "Carville B. Collins". The signature is fluid and cursive, with the first name "Carville" being more prominent.

Carville B. Collins  
Counsel to NeuStar, Inc.

CBC/cgc  
Enclosures

cc: Sanford S. Williams, Federal Communications Commission (hand delivered by Neustar)  
Alex Kondé, Associate General Counsel, NeuStar, Inc.



TAB 1	NeuStar, Inc. Corporate Structure Chart
TAB 2	Restated Certificate of Incorporation
TAB 3	Neustar A/B Stock Certificates
TAB 4	Neutrality Board of Directors Resolution
TAB 5	Neustar Code of Conduct and Further Neutrality Obligations



REDACTED--FOR PUBLIC INSPECTION

## **TAB 1**



REDACTED—FOR PUBLIC INSPECTION

# CONFIDENTIAL

REDACTED--FOR PUBLIC INSPECTION

**TAB 2**



# Delaware

PAGE 1

*The First State*

I, JEFFREY W. BULLOCK, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY THE ATTACHED ARE TRUE AND CORRECT COPIES OF ALL DOCUMENTS FILED FROM AND INCLUDING THE RESTATED CERTIFICATE OR A MERGER WITH A RESTATED CERTIFICATE ATTACHED OF "NEUSTAR, INC." AS RECEIVED AND FILED IN THIS OFFICE.

THE FOLLOWING DOCUMENTS HAVE BEEN CERTIFIED:

RESTATED CERTIFICATE, FILED THE TWENTY-EIGHTH DAY OF JUNE, A.D. 2005, AT 10:53 O'CLOCK A.M.



2975674 8100X

110747156

You may verify this certificate online  
at [corp.delaware.gov/authver.shtml](http://corp.delaware.gov/authver.shtml)

  
Jeffrey W. Bullock, Secretary of State  
AUTHENTICATION: 8851195

DATE: 06-21-11

State of Delaware  
Secretary of State  
Division of Corporations  
Delivered 11:00 AM 06/28/2005  
FILED 10:53 AM 06/28/2005  
SRV 050536840 - 2975674 FILE

**RESTATED CERTIFICATE OF INCORPORATION  
OF  
NEUSTAR, INC.  
(a Delaware corporation)**

NEUSTAR, INC., a corporation organized and existing under and by virtue of the provisions of the General Corporation Law of Delaware, hereby certifies as follows:

1. The name of the corporation is NeuStar, Inc. NeuStar, Inc. was originally incorporated under the name "CIS ACQUISITION CORPORATION," and the original Certificate of Incorporation was filed with the Secretary of State of the State of Delaware on December 8, 1998.
2. Pursuant to Sections 242 and 245 of the General Corporation Law of the State of Delaware, this Restated Certificate of Incorporation restates and integrates and further amends the provisions of the Restated Certificate of Incorporation of this corporation.
3. The text of the Restated Certificate of Incorporation as heretofore amended or supplemented is hereby restated and further amended to read in its entirety as follows:

**ARTICLE I  
NAME OF CORPORATION**

The name of this corporation (the "Corporation") is:

NeuStar, Inc.

**ARTICLE II  
REGISTERED OFFICE**

The address of the registered office of the Corporation in the State of Delaware is 1209 Orange Street in the City of Wilmington, County of New Castle. The name of the Corporation's registered agent at such address is The Corporation Trust Company.

**ARTICLE III  
PURPOSE**

The purpose of the Corporation is to engage in any lawful act or activity for which corporations may be organized under the General Corporation Law of the State of Delaware (the "Delaware Code").



#### ARTICLE IV AUTHORIZED CAPITAL STOCK

A. General. The total authorized capital stock of the Corporation shall be: four hundred million (400,000,000) shares, consisting of three classes:

1. two hundred million (200,000,000) shares of Class A Common Stock, \$0.001 par value per share (the "**Class A Common Stock**");
2. one hundred million (100,000,000) shares of Class B Common Stock, \$0.001 par value per share (the "**Class B Common Stock**" and, together with the Class A Common Stock, the "**Common Stock**"); and
3. one hundred million (100,000,000) shares of preferred stock, \$0.001 par value per share, as may be issued from time to time, in one or more series, to be determined by the Board of Directors, each of said series to be distinctly designated (such shares, the "**Preferred Stock**").

Upon this Certificate becoming effective, each share of common stock that is then outstanding shall be reclassified into 1.40 shares of Class B Common Stock. No certificate or scrip representing fractional shares of Class B Common Stock shall be issued in connection with such reclassification, and such fractional share interests will not entitle the owner thereof to vote or to any rights of a stockholder of the Corporation. Upon delivery of stock certificates in connection with such reclassification, each stockholder who would otherwise have been entitled to receive a fraction of a share of Class B Common Stock (after taking into account all stock certificates delivered by such stockholder) shall receive, in lieu thereof, cash (without interest) in an amount equal to such fractional part of a share of Class B Common Stock multiplied by the purchase price of a share of Class A Common Stock offered to the public in the Corporation's initial public offering.

B. Common Stock. The relative powers, preferences and rights of, and the qualifications, limitations and restrictions granted to and imposed upon, the Class A Common Stock and Class B Common Stock are as follows:

1. Dividends. Whenever a dividend is paid to the holders of one class of Common Stock, the Corporation also shall pay an equal dividend to the holders of the other class of Common Stock; *provided, however*, that if a distribution of additional shares of Common Stock is to be paid to holders of Common Stock, such distribution shall be for an equal amount of shares, and holders of Class A Common Stock will be paid additional shares of Class A Common Stock and holders of Class B Common Stock will be paid additional shares of Class B Common Stock. Dividends shall be payable only as and when declared by the Board of Directors.
2. Reclassification. Unless otherwise approved by the holders of a majority of each class of Common Stock voting separately, the Corporation shall not subdivide or combine one class of its Common Stock without subdividing or combining the other class of Common Stock, on an equal per share basis, and shall not reclassify one class of its Common Stock, unless the shares of each class are reclassified into identical securities.



3. Voting. Except as required by law or as otherwise provided in this Restated Certificate of Incorporation, all holders of Common Stock shall vote together as a single class, and each holder of Common Stock shall be entitled to one vote per share of Class A Common Stock and one vote per share of Class B Common Stock; *provided, however, that*, except as otherwise required by law, holders of Common Stock shall not be entitled to vote on any amendment to this Certificate of Incorporation (including any Certificate of Designations relating to any series of Preferred Stock) that relates solely to the terms of one or more outstanding series of Preferred Stock if the holders of such affected series are entitled, either separately or together as a class with the holders of one or more other such series, to vote thereon pursuant to this Certificate of Incorporation (including any Certificate of Designations relating to any series of Preferred Stock). The number of authorized shares of any class of stock may be increased or decreased (but not below the number of shares thereof then outstanding) by the affirmative vote of the holders of a majority of the stock of the Corporation, irrespective of Section 242(b)(2) of the Delaware General Corporation Law, without a separate class vote of the holders of such class.

4. Liquidation and Mergers. Unless otherwise approved by the holders of a majority of each class of Common Stock voting separately, the holders of Class A Common Stock and the holders of Class B Common Stock shall share equally, on a share for share basis, on any distribution of the Corporation's assets upon any liquidation, dissolution or winding up of the Corporation, whether voluntary or involuntary, after payment or provision for payment of the debts and other liabilities of the Corporation, and shall have be entitled to receive the same consideration, on a share for share basis, in the event of any merger or consolidation in which shares of Common Stock of the Corporation are converted into cash, securities or other property.

5. Conversion.

a. Voluntary Conversion. Each holder of record of Class B Common Stock may, at any time or from time to time, in such holder's sole discretion and at such holder's option, convert any or all of such holder's shares of Class B Common Stock into fully paid and non-assessable Class A Common Stock at the rate of one share of Class A Common Stock for each share of Class B Common Stock surrendered for conversion. Any such conversion may be effected by any holder of Class B Common Stock **surrendering such holder's** certificate or certificates for the Class B Common Stock to be converted, duly endorsed, at the office of the Corporation or any transfer agent for the Class B Common Stock, together with a written notice to the Corporation at such office that such holder elects to convert all or a specified number of shares of Class B Common Stock to be issued. If so required by the Corporation, any certificate for shares surrendered for conversion shall be accompanied by instruments of transfer, in form satisfactory to the Corporation, duly executed by the holder of such shares or the duly authorized representative of such holder. Promptly thereafter, the Corporation shall issue and deliver to such holder or such holder's nominee or nominees, a certificate or certificates for the number of shares of Class A Common Stock to which such holder shall be entitled as herein provided. Such conversion shall be deemed to have been made at the close of business on the date of receipt by the Corporation or any such transfer agent of the documentation required to be delivered by the holder of such Class B Common Stock, and the person or persons entitled to receive the Class A Common Stock



issuable on such conversion shall be treated for all purposes as the record holder or holders of such Class A Common Stock on that date.

b. Retirement of Class B Common Stock. No additional shares of Class B Common Stock shall be issued or disposed of by the Corporation after the date hereof, except pursuant to a stock split or stock dividend or pursuant to the terms of any convertible security issued prior to the reclassification of the Corporation's Common Stock into Class B Common Stock pursuant to this Restated Certificate of Incorporation. Upon conversion of Class B Common Stock into Class A Common Stock, the Class B Common Stock so converted shall be retired and shall not be reissued.

c. Restriction on Transfer and Ownership of Shares. The restrictions set forth in Article IV, Section D of the Corporation's Certificate of Incorporation ("Restriction on Transfer and Ownership of Shares") shall apply to all shares of capital stock of the Corporation except that, to the extent that Delaware law would prohibit the enforcement of such restrictions on the shares of Class B Common Stock issued upon reclassification of the Corporation's common stock effected pursuant to this Restated Certificate of Incorporation, such restrictions shall not apply to such shares. The Corporation is hereby authorized to place any required legend or make any other required notations in its books and records to reflect such restrictions.

d. Tax Matters. The issuance of certificates for shares of Class A Common Stock issuable upon the conversion of Class B Common Stock shall be made without charge to the converting holder for any tax imposed on the Corporation in respect of the issue thereof. The Corporation shall not, however, be required to pay any tax which may be payable with respect to any transfer involved in the issue and delivery of any certificate in a name other than that of the holder of the shares being converted, and the Corporation shall not be required to issue or deliver any such certificate unless and until the person requesting the issue thereof shall have paid to the Corporation the amount of such tax or has established to the satisfaction of the Corporation that such tax has been paid.

C. Preferred Stock. The Board of Directors is authorized, subject to limitations prescribed by law and the provisions of this Article IV, to provide for the issuance of the shares of Preferred Stock in series, and by filing a certificate pursuant to the applicable law of the State of Delaware, to establish from time to time the number of shares to be included in each such series, and to fix the designation, powers (including voting powers), preferences and rights of the shares of each such series and the qualifications, limitations or restrictions thereof.

D. Restriction on Transfer and Ownership of Shares.

1. Definitions. For the purpose of this Article IV, Section D, the following terms shall have the following meanings. Unless explicitly noted otherwise, any cross-reference to a "Section" within any of the sections of this Article IV, Section D shall be deemed to refer to other sections within this Article IV, Section D. The terms used in this Article IV, Section D shall have the meanings set forth below:

**"Aggregate Stock Ownership Limit"** shall mean the number of shares of Capital Stock that would entitle a stockholder to nine and nine tenths percent (9.9%) of the aggregate voting power with respect to the election of directors or other matters submitted to the stockholders generally for their approval.

**"Beneficial Ownership"** shall mean ownership of Capital Stock by a Person, whether the interest in the shares of Capital Stock is held directly or indirectly (including by a nominee). The terms **"Beneficial Owner"** and **"Beneficially Own"** shall have the correlative meanings. A Person shall be deemed the Beneficial Owner of and shall be deemed to Beneficially Own:

a. any securities that such Person beneficially owns, directly or indirectly, for purposes of Section 13(d) of the Exchange Act and Rule 13d-3 promulgated under the Exchange Act, in each case as in effect on the date hereof;

b. any securities that such Person has the right to vote, alone or in concert with others, pursuant to any agreement, arrangement or understanding; *provided*, that a Person shall not be deemed the Beneficial Owner of, or to Beneficially Own, any security if the agreement, arrangement or understanding to vote such security (A) arises solely from a revocable proxy given to such Person in response to a public proxy solicitation made pursuant to and in accordance with the applicable rules and regulations promulgated under the Exchange Act, and (B) is not also then reportable on Schedule 13D under the Exchange Act (or any comparable or successor report);

c. any securities that are beneficially owned, directly or indirectly, by any other Person with which such Person has any agreement, arrangement or understanding for the purpose of acquiring, holding, voting (other than voting pursuant to a revocable proxy as described in the proviso to clause b of this definition of "Beneficial Owner") or disposing of any securities of the Company.

**"Capital Stock"** shall mean all classes or series of capital stock of the Corporation, including without limitation Common Stock and Preferred Stock.

**"Divestiture Shares"** means those shares of Capital Stock (rounded to the nearest whole share) that a Person is required to sell in order to comply with the stock ownership restrictions set forth in Section 3.a; *provided*, that if such Person holds more than one class of Capital Stock, Divestiture Shares must be of the same class as those shares acquired by such Person in the Transfer that triggered Section 3.b.

**"Excepted Holder"** shall mean any stockholder of the Corporation for whom, to the extent consistent with the FCC Neutrality Requirements, an Excepted Holder Limit is created by the Corporation's Certificate of Incorporation, as amended from time to time, or by the Board of Directors pursuant to Section 3.h.

**"Excepted Holder Limit"** shall mean, provided that the affected Excepted Holder agrees to comply with the requirements established by the Board of Directors pursuant to Section 3.h and subject to adjustment pursuant to Section 3.k, the stock ownership limit applicable to such Excepted Holder as established by the Board of



Directors pursuant to Section 3.h, which shall be consistent with the FCC Neutrality Requirements.

**"Excess Shares"** means the number of shares Beneficially Owned by a Person in excess of the Aggregate Stock Ownership Limit.

**"FCC"** means the Federal Communications Commission.

**"FCC Neutrality Requirements"** means the neutrality requirements to which the Corporation is subject under the applicable laws, regulations, rules and orders of the FCC.

**"Initial Date"** shall mean the closing date of the Initial Public Offering.

**"Initial Public Offering"** shall mean the initial public offering of shares of the Corporation's Capital Stock pursuant to an effective registration statement under the Securities Act (other than a Form S-8 or successor form) covering the offer and sale of such shares, including an offering comprised of shares held solely by the Corporation's stockholders.

**"Market Price"** on any date shall mean, with respect to any class or series of outstanding shares of Capital Stock, the Closing Price for such Capital Stock on such date. The "Closing Price" on any date shall mean the last reported sale price for such Capital Stock, regular way, or, in case no such sale takes place on such day, the average of the closing bid and asked prices, regular way, for such Capital Stock, in either case as reported in the principal consolidated transaction reporting system with respect to securities listed or admitted to trading on the NYSE or, if such Capital Stock is not listed or admitted to trading on the NYSE, as reported on the principal consolidated transaction reporting system with respect to securities listed on the principal national securities exchange on which such Capital Stock is listed or admitted to trading or, if such Capital Stock is not listed or admitted to trading on any national securities exchange, the last quoted price, or, if not so quoted, the average of the high bid and low asked prices in the over-the-counter market, as reported by the NASDAQ or, if such system is no longer in use, the principal other automated quotation system that may then be in use or, if such Capital Stock is not quoted by any such organization, the average of the closing bid and asked prices as furnished by a professional market maker making a market in such Capital Stock selected by the Board of Directors of the Corporation or, in the event that no trading price is available for such Capital Stock, the fair market value of the Capital Stock, as determined in good faith by the Board of Directors of the Corporation.

**"NASDAQ"** means the National Association of Securities Dealers, Inc. Automated Quotation System.

**"NYSE"** shall mean the New York Stock Exchange.

**"Person"** shall mean an individual, corporation, partnership, estate, trust, association, joint stock company or other entity and also includes a "group" as that term is used for purposes of Section 13(d)(3) of the Securities Exchange Act of 1934.

**"Post-IPO TSP Stock Ownership Limit"** shall mean the number of shares of Capital Stock that would entitle a stockholder to five percent (5.0%) of the aggregate voting power with respect to the election of directors or other matters submitted to the stockholders generally for their approval.

**"Prohibited Owner"** shall mean any Person who Beneficially Owns or purports to Beneficially Own shares of Capital Stock which results or would result in a violation of the provisions of Section 3.a; *provided, however*, that no party to the Voting Trust Agreement or the Stockholders Agreement will be considered to be a "Prohibited Owner" as a result of being a party to either or both of the Voting Trust Agreement and the Stockholders Agreement. For purposes of this Article IV, Section D, the Corporation may enforce the provisions set forth herein directly against (a) the record owner of the shares of Capital Stock that are held on behalf of a Person whose Beneficial Ownership or purported Beneficial Ownership results or would result in a violation of the provisions of Section 3.a, (b) any other holder with dispositive power over such shares, including any bank, broker or other securities intermediary who holds such shares on behalf of such Person; or (c) if applicable, any Person who holds or purports to hold the right to vote the shares of Capital Stock, whether by virtue of a proxy, voting agreement or otherwise.

**"Restriction Termination Date"** shall mean the first day after the Initial Date on which the Board of Directors determines that compliance with the restrictions and limitations on Beneficial Ownership and Transfers of shares of Capital Stock set forth herein is no longer required in order for the Corporation to comply with the FCC Neutrality Requirements.

**"Status Change"** shall mean, with respect to any Person, any event, occurrence, transaction or other circumstance which results in such Person becoming a TSP or TSP Affiliate (whether due to an action taken by such Person or otherwise).

**"Stockholders Agreement"** shall mean the Stockholders Agreement between the Corporation and certain of its stockholders, of even date herewith, as amended from time to time, including any successor agreement, if applicable.

**"Transfer"** shall mean any issuance, acquisition, sale, transfer, gift, assignment, devise or other disposition, as well as any other event that causes any Person to acquire or increase its percentage Beneficial Ownership of Capital Stock, including (i) any acquisition or disposition of any securities or rights convertible into or exchangeable for Capital Stock or any interest in Capital Stock or any exercise of any such conversion or exchange right, including an acquisition of such securities by the Corporation (ii) transfers of interests in other entities that result in changes in Beneficial Ownership of Capital Stock; in each case, whether voluntary or involuntary, whether owned of record or Beneficially Owned, and whether by operation of law or otherwise, and (iii) entering into a voting agreement or voting trust (other than the Voting Trust or the Stockholders Agreement). The terms **"Transferring"** and **"Transferred"** shall have the correlative meanings.



**"TSP" or "TSP Affiliate"** means any of the following: (i) a telecommunications service provider, as that term is defined in 47 C.F.R. § 52.12(a)(1)(i) or successor regulations; (ii) an affiliate of a telecommunications service provider, as defined in 47 C.F.R. § 52.12(a)(1)(i) or successor regulations; and (iii) any Person deemed to be a TSP or TSP Affiliate by virtue of Section 3.e.

**"Voting Trust"** shall mean the voting trust governed by the Amended and Restated Trust Agreement, dated September 24, 2004 (as amended from time to time, including any successor agreement if applicable, the **"Voting Trust Agreement"**).

**"Voting Trustee"** shall mean, collectively, the trustees for the Voting Trust appointed in accordance with its terms (including, if applicable, any successor trustees), and if the context requires, each such trustee individually.

2. **Private Company Restrictions.** From the effective date of this provision until the earlier of (i) the Initial Date, and (ii) the Restriction Termination Date, the following restrictions on ownership and transfer of Capital Stock shall apply:

a. **No Issuance to TSPs or TSP Affiliates:** The Corporation shall not issue shares of Capital Stock to any Person who is a TSP or TSP Affiliate without the written approval or consent of the FCC; *provided, however*, that in determining whether a Person is a TSP or TSP Affiliate, the Corporation shall be entitled to rely on representations, warranties, covenants and undertakings from such Person.

b. **Basic Restriction.** No Person may Beneficially Own shares of Capital Stock in excess of the Aggregate Stock Ownership Limit (whether by virtue of a Transfer of shares of Capital Stock or otherwise), unless such Person's Excess Shares are Transferred to the Voting Trust.

c. **Transfer in Voting Trust.** If any Transfer of shares of Capital Stock occurs which, if effective, would result in any Person Beneficially Owning shares of Capital Stock in excess of the Aggregate Stock Ownership Limit, then:

- (i) such Person's Excess Shares shall be automatically Transferred to the Voting Trust in exchange for voting trust certificates; and
- (ii) such Person shall submit such number of shares of Capital Stock to the Voting Trust for registration in the name of the Voting Trust.

d. **Notice.** Any Person who acquires or intends to acquire Beneficial Ownership of shares of Capital Stock that will cause such Person's Beneficial Ownership to exceed the Aggregate Stock Ownership Limit shall immediately give written notice to the Corporation of such event, or in the case of such a proposed or attempted transaction, give at least fifteen (15) days prior written notice, and shall provide to the Corporation such other information as the Corporation may request in order to determine the effect, if any, of such Transfer on the Corporation.

e. Enforcement. The Corporation is authorized specifically to seek equitable relief, including injunctive relief, to enforce the provisions of this Section 2.

f. Non-Waiver. No delay or failure on the part of the Corporation or the Board of Directors in exercising any right hereunder shall operate as a waiver of any right of the Corporation or the Board of Directors, as the case may be, except to the extent specifically waived in writing.

g. Ambiguity. In the case of an ambiguity in the application of any of the provisions of this Section 2, or any definition contained in Section 1, the Board of Directors shall have the power to determine the application of the provisions of this Section 2 or any such definition with respect to any situation based on the facts reasonably believed in good faith by it. In the event Section 2 requires an action by the Board of Directors and the Restated Certificate of Incorporation fails to provide specific guidance with respect to such action, the Board of Directors shall have the power to determine the action to be taken so long as such action is not contrary to the provisions of Sections 1, 2 or 3.

h. Legend. Each certificate for shares of Capital Stock shall bear a legend that states that there are certain restrictions on transfer of the Corporation's stock, about which the Corporation will furnish a full statement to any stockholder on request and without charge.

i. Status of Shares Held by the Voting Trustee.

- (i) Shares of Capital Stock held by the Voting Trustee shall continue to be issued and outstanding shares of Capital Stock of the Corporation. The Beneficial Owner shall have the power to dispose of the Excess Shares, and the rights to any dividends or other distributions in respect of the Excess Shares.
- (ii) The Voting Trustee shall have all voting rights with respect to shares of Capital Stock held in the Voting Trust, subject to the terms and conditions set forth in the Voting Trust Agreement. Any dividend or other distribution paid to a Voting Trustee shall be paid with respect to such shares of Capital Stock held by the Voting Trustee to the applicable Beneficial Owner promptly following receipt by the Voting Trustee. Subject to Delaware law, effective as of the date that the shares of Capital Stock have been transferred to the Voting Trustee, the Voting Trustee shall have the authority: (A) to rescind as void any vote cast by a Beneficial Owner prior to the discovery by the Corporation that the shares of Capital Stock have been transferred to the Voting Trustee; and (B) to recast such vote in accordance with the terms and conditions of the Voting Trust Agreement; *provided, however*, that if the Corporation has already taken irreversible corporate action, then



the Voting Trustee shall not have the authority to rescind and recast such vote.

j. Severability. If any term or provision specified in this Section 2 is held by a court of competent jurisdiction to be in violation of any applicable law or public policy, and if such court should declare such term or provision to be illegal, invalid, unlawful, void, voidable or unenforceable as written, then such provision shall be given full force and effect to the fullest possible extent that it is legal, valid and enforceable, and the remainder of the terms and provisions herein shall be construed as if such illegal, invalid, unlawful, void, voidable or unenforceable term or provision were not contained herein.

3. Public Company Restrictions. From the Initial Date until the Restriction Termination Date, the following restrictions on ownership and transfer of Capital Stock shall apply:

a. Basic Restrictions. (i) No Person who is a TSP or TSP Affiliate, other than an Excepted Holder, shall Beneficially Own shares of Capital Stock equal to, or in excess of, the Post-IPO TSP Stock Ownership Limit, and (ii) no Excepted Holder shall Beneficially Own shares of Capital Stock in excess of the Excepted Holder Limit for such Excepted Holder.

b. Required Divestiture.

(i) If (A) any Person experiences a Status Change that results in a violation of Section 3.a; or (B) any Transfer of shares of Capital Stock (whether or not such Transfer is the result of a transaction entered into through the facilities of the NASDAQ, NYSE or any other national securities exchange or automated inter-dealer quotation system) occurs which, if effective, would result in any Person becoming a Prohibited Owner, then (I) within five (5) business days after the Corporation has delivered written notice to such Person that it is a Prohibited Owner, such Person shall sell his, her or its Divestiture Shares; *provided*, that if the Corporation's notice indicates that the Corporation exercises its right under Section 3.b(ii) hereof, such Person shall sell such shares to the Corporation or its designee in accordance with the terms and conditions of Section 3(b)(ii); *provided, further*, that if the Corporation does not exercise its right under Section 3.b(ii), such Person shall only sell such Divestiture Shares to a third party whose ownership of the shares will not violate the ownership limitations set forth in Section 3.a; and (II) within five (5) business days after the sale discussed in Section 3.b(i) is consummated, such Person shall deliver written notice of such sale to the Corporation.

- (ii) Upon the occurrence of the Status Change or the consummation of the Transfer that results in a violation of the ownership limitations set forth in Section 3.a, as the case may be, the Prohibited Owner shall be deemed to have offered his, her or its Divestiture Shares (free of any liens, or any voting restrictions or proxies) for sale to the Corporation, or its designee, at a price per share equal to the Market Price on the date the Corporation, or its designee, accepts such offer. The Corporation shall have the right to accept such offer until the Prohibited Owner has notified the Corporation that the Divestiture Shares have been sold in accordance with Section 3.b(i).

c. Other Remedies for Breach. If the Board of Directors, any duly authorized committee thereof (or, if permitted by the DGCL, any other Person designated by the Board of Directors or any duly authorized committee thereof) shall at any time determine in good faith that a Transfer or other event has taken place that results in a violation of Section 3.a or that a Person intends to acquire or has attempted to acquire Beneficial Ownership of any shares of Capital Stock in violation of Section 3.a (whether or not such violation is intended), the Board of Directors or a committee thereof or other designees if permitted by the DGCL shall take such action as it deems advisable to refuse to give effect to or to prevent such Transfer or other event, including, without limitation, refusing to register or otherwise give effect to such Transfer on the books of the Corporation, disregarding any vote of such shares of Capital Stock in accordance with Section 3.j, or instituting proceedings to enjoin such Transfer, vote or other event. Nothing in this Section 3 shall restrict the Corporation's authority, at its election, to purchase Divestiture Shares from a Prohibited Owner pursuant to Section 3.b(ii); *provided, however*, that to the extent that such purchase by the Corporation causes any Person's Beneficial Ownership to equal or exceed the Post-IPO TSP Stock Ownership Limit, such Person will be subject to the notice and certification requirements in Section 3.e; *provided, further, however*, that to the extent that such purchase by the Corporation causes any Person to become a Prohibited Owner due to the increase in such Person's percentage Beneficial Ownership, such Person will be subject to all the restrictions set forth herein, including the required divestiture provisions set forth in Section 3.b and the restrictions on voting Divestiture Shares set forth in Section 3.j.

d. Notice of Restricted Transfer. Any Person who acquires, or attempts or intends to acquire, Beneficial Ownership of shares of Capital Stock that will or may violate Section 3.a shall immediately give written notice to the Corporation of such event, or in the case of such a proposed or attempted transaction, give at least fifteen (15) days prior written notice, and shall provide to the Corporation such other information as the Corporation may request relating to the Transfer or Transferee.

e. Owners Required To Provide Information. From the Initial Date until the Restriction Termination Date:

- (i) Every Beneficial Owner of shares equal to or in excess of the Post-IPO TSP Stock Ownership Limit, within five (5) business days



after the Transfer that caused such Beneficial Owner's stock ownership to equal or exceed the Post-IPO TSP Stock Ownership Limit, shall give written notice to the Corporation certifying (A) the name and address of such owner, (B) the number of shares of Capital Stock Beneficially Owned; (C) a description of the manner in which such shares are held; and (D) that such Beneficial Owner is not a TSP or a TSP Affiliate. In addition, each such Beneficial Owner shall provide to the Corporation such additional information as the Corporation may request in order to determine the effect, if any, of such Beneficial Ownership on the Corporation. In the event that such Beneficial Owner experiences a Status Change, such Beneficial Owner shall, within 5 business days of such Status Change, give written notice thereof to the Corporation (and such Beneficial Owner shall be subject to all restrictions to which a TSP or TSP Affiliate is subject, including without limitation Section 3.b and 3.c, effective as of the date of such Status Change).

- (ii) At its discretion, the Board shall be entitled to treat any Person who fails to supply the written certification contemplated by Section 3.e(i) as a TSP or TSP Affiliate, and such Person shall then be treated as a TSP or TSP Affiliate hereunder, including being subject to all restrictions to which a TSP or TSP Affiliate is subject, including without limitation Section 3.b and 3.c.
- (iii) Each Person who is a Beneficial Owner of Capital Stock and each Person (including the stockholder of record) who is holding Capital Stock Beneficially Owned by another Person shall provide to the Corporation such information as the Corporation may reasonably request, in good faith, in order to ensure compliance with the restrictions on ownership and transfer set forth herein.

f. Remedies Not Limited. Nothing contained in this Section 3 shall limit the authority of the Board of Directors to take such other action as it deems necessary or advisable to protect the Corporation and the interests of its stockholders, including any action to comply with the FCC Neutrality Requirements.

g. Ambiguity. In the case of an ambiguity in the application of any of the provisions of this Section 3, or any definition contained in Section 1, the Board of Directors shall have the power to determine the application of the provisions of this Section 3 or any such definition with respect to any situation based on the facts reasonably believed in good faith by it. In the event Section 3 requires an action by the Board of Directors and the Restated Certificate of Incorporation fails to provide specific guidance with respect to such action, the Board of Directors shall have the power to determine the action to be taken so long as such action is not contrary to the provisions of Sections 1, 2 or 3.

h. Exceptions.

- (i) To the extent consistent with the FCC Neutrality Requirements, the Board of Directors, in its sole discretion, may exempt (prospectively or retroactively) a Person from the Post-IPO TSP Stock Ownership Limit, and may establish or increase an Excepted Holder Limit for such Person if the Board of Directors obtains such representations, covenants and undertakings from such Person, as well as any necessary approvals or other consents from any governmental authority (including without limitation the FCC) as the Board of Directors may deem necessary or appropriate in order to conclude that granting the exemption and/or establishing or increasing the Excepted Holder Limit, as the case may be, will not cause the Corporation to violate any of the FCC Neutrality Requirements.
- (ii) Prior to granting any exception pursuant to Section 3.h(i), the Board of Directors may require notice to or, if applicable, a ruling or approval from the FCC, or an opinion of counsel, in any case in form and substance satisfactory to the Board of Directors in its sole discretion. Notwithstanding the giving of such notice, or the receipt of any ruling or opinion, the Board of Directors may impose such conditions or restrictions as it deems appropriate in connection with granting such exception. The Board of Directors may terminate or provide for the automatic termination of the Excepted Holder Limit for any Person in the event that such Person fails to comply with such conditions or restrictions as are established by the Board of Directors pursuant to this Section 3.h(ii).
- (iii) Notwithstanding anything herein to the contrary, an underwriter or placement agent that participates in a public offering or a private placement of Capital Stock (or securities convertible into or exchangeable for Capital Stock) may Beneficially Own shares of Capital Stock (or securities convertible into or exchangeable for Capital Stock) in excess of the Post-IPO TSP Stock Ownership Limit (regardless of whether such underwriter or placement agent is a TSP or TSP Affiliate), but only to the extent necessary to facilitate such public offering or private placement and provided that the restrictions contained in Section 3.a will not be violated following the distribution by such underwriter or placement agent of such shares of Capital Stock.

i. Legend. Each certificate for shares of Capital Stock shall bear substantially the following legend: "The shares represented by this certificate are subject to restrictions on ownership and transfer set forth in Article IV of the Corporation's Restated Certificate of Incorporation. In addition to certain further restrictions and



except as expressly provided in the Corporation's Restated Certificate of Incorporation, no TSP or TSP Affiliate may Beneficially Own shares of the Corporation's Capital Stock equal to, or in excess of, five percent (5.0%) of the voting power of the Corporation, unless such Person is an Excepted Holder (in which case the Excepted Holder Limit shall be applicable). Any Person who Beneficially Owns or attempts to Beneficially Own shares of Capital Stock which causes or will cause a Person to Beneficially Own shares of Capital Stock in excess or in violation of the above limitations must immediately notify the Corporation. If any of the restrictions on transfer or ownership are violated, the holder of the shares of Capital Stock represented hereby will be required to sell excess shares immediately either to the Corporation or its designee (at the Corporation's election) or to another Person whose Beneficial Ownership of such shares will not violate such restrictions on transfer or ownership. All capitalized terms in this legend have the meanings defined in the Corporation's Restated Certificate of Incorporation, as the same may be amended from time to time, a copy of which, including the restrictions on transfer and ownership, will be furnished to each holder of Capital Stock of the Corporation on request and without charge. Requests for such a copy may be directed to the Secretary of the Corporation at its principal office."

- j. Prohibited Owner's Rights With Respect To Divestiture Shares.
  - (i) General. Divestiture Shares shall continue to be issued and outstanding shares of Capital Stock of the Corporation.
  - (ii) No Voting Rights Relating to Divestiture Shares. Subject to Delaware law, effective as of the date of the Transfer that triggered the application of Section 3.b, the Prohibited Holder shall not be entitled to vote any Divestiture Shares on any matters presented to the Corporation's stockholders for their approval and the Corporation shall disregard any vote cast by a Prohibited Owner in respect of Divestiture Shares; *provided, however*, that until such time as the Corporation receives notice that a Transfer, Status Change or other event has occurred that resulted in a Person Beneficially Owning shares of Capital Stock in violation of Section 3.a, the Corporation shall, subject to Delaware law, be entitled to rely on its share transfer and other stockholder records for purposes of preparing lists of stockholders entitled to vote at meetings, determining the validity and authority of proxies and otherwise conducting votes of stockholders.
  - (iii) Dividends and Sale Proceeds. The Prohibited Owner shall have the right to receive dividends, if any, and the proceeds from the sale of such Divestiture Shares.
- k. Change in Post-IPO TSP Stock Ownership Limit. To the extent consistent with the FCC Neutrality Requirements, the Board of Directors may from time to time increase or decrease the Post-IPO TSP Stock Ownership Limit; *provided, however*, that stockholders shall receive notice of any such change, and a certificate of

any such change shall be maintained and made available to any stockholder upon request; *provided; further*, that a decreased Post-IPO TSP Stock Ownership Limit will not be effective for any Person whose percentage ownership of Capital Stock is in excess of such decreased Post-IPO TSP Stock Ownership Limit until such time as such Person's percentage of Capital Stock equals or falls below the decreased Post-IPO TSP Stock Ownership Limit, but any further acquisition of Capital Stock in excess of the decreased Post-IPO TSP Stock Ownership Limit of Capital Stock will be in violation of the Post-IPO TSP Stock Ownership Limit.

l. NYSE or NASDAQ Transactions. Nothing in this Section 3 shall preclude the settlement of any transaction entered into through the facilities of NASDAQ, NYSE or any other national securities exchange or automated inter-dealer quotation system. The fact that the settlement of any transaction occurs shall not negate the effect of any other provision of this Section 3 and any transferee in such a transaction shall be subject to all of the provisions and limitations set forth in this Section 3.

m. Enforcement. The Corporation is authorized specifically to seek equitable relief, including injunctive relief, to enforce the provisions of this Section 3.

n. Non-Waiver. No delay or failure on the part of the Corporation or the Board of Directors in exercising any right hereunder shall operate as a waiver of any right of the Corporation or the Board of Directors, as the case may be, except to the extent specifically waived in writing.

o. Severability. If any term or provision specified in this Section 3 is held by a court of competent jurisdiction to be in violation of any applicable law or public policy, and if such court should declare such term or provision to be illegal, invalid, unlawful, void, voidable or unenforceable as written, then this Section 3 shall be deemed to include such provision to the fullest possible extent that it is legal, valid and enforceable, and the remainder of the terms and provisions herein shall be construed as if such illegal, invalid, unlawful, void, voidable or unenforceable term or provision were not contained herein.

## ARTICLE V BOARD POWER REGARDING BYLAWS

In furtherance and not in limitation of the powers conferred by statute, the Board of Directors is expressly authorized to make, repeal, alter, amend and rescind the bylaws of the Corporation.

## ARTICLE VI ELECTION OF DIRECTORS

A. Subject to the rights of the holders of any series of preferred stock to elect directors under specified circumstances, the number of directors constituting the entire Board of Directors of the Corporation shall be not less than three nor more than fifteen, as fixed from time



to time by vote of a majority of the entire Board of Directors; *provided, however*, that the number of directors shall not be reduced so as to shorten the term of any director at the time in office; *provided, further*, that the number of directors constituting the entire Board of Directors shall be seven until otherwise fixed by a majority of the entire Board of Directors.

B. Beginning with the initial annual meeting, the Board of Directors shall be divided into three classes: Class I, Class II and Class III. The terms of office of the classes of directors elected at the initial annual meeting shall expire at the times of the annual meetings of the stockholders as follows: Class I on the next annual meeting, Class II on the second next annual meeting and Class III on the third next annual meeting, or thereafter in each case when their respective successors are elected and qualified. At each subsequent annual election, the directors chosen to succeed those whose terms are expiring shall be identified as being of the same class as the directors whom they succeed, and shall be elected for a term expiring at the time of the third succeeding annual meeting of stockholders, or thereafter in each case when their respective successors are elected and qualified. Subject to the rights of the holders of any series of preferred stock then outstanding, any vacancies in the Board of Directors for any reason, and any directorships resulting from any increase in the number of directors, may be filled by the Board of Directors, acting by a majority of the directors then in office, although less than a quorum, and any directors so chosen shall hold office until the next election of the class for which such directors have been chosen and until their successors shall be elected and qualified. The number of directorships shall be apportioned among the classes so as to maintain the classes as nearly equal in number as possible. Elections of directors need not be by written ballot.

## **ARTICLE VII LIABILITY**

No director of the Corporation shall be personally liable to the Corporation or any stockholder for monetary damages for breach of fiduciary duty as a director, except for liability (a) for any breach of the director's duty of loyalty to the Corporation or its stockholders, (b) for acts or omissions not in good faith or which involve intentional misconduct or a knowing violation of law, (c) under Section 174 of the Delaware Code or any amendment thereto or successor provision thereof, or (d) for any transaction from which the director derived an improper personal benefit. If the Delaware Code is amended to authorize corporate action further eliminating or limiting the personal liability of directors, then the liability of a director of the corporation shall be eliminated or limited to the fullest extent permitted by the Delaware Code, as so amended. Any repeal or modification of this provision shall not adversely affect any right or protection of a director of the corporation existing at the time of such repeal or modification.

## **ARTICLE VIII INDEMNIFICATION**

### **A. Right to Indemnification.**

1. Subject to the limitations set forth in Section A.2 of this Article VIII, each person who was or is made a party or is threatened to be made a party to or is otherwise involved in any Proceeding, by reason of the fact that he or she is or was a director or an executive officer

of the Corporation or is or was a director or executive officer of the Corporation serving at the request of the Corporation as a director, officer, trustee or agent of another corporation or of a partnership, joint venture, trust or other enterprise, including service with respect to an employee benefit plan (such person, an "Indemnitee"), whether the basis of such Proceeding is alleged action in an official capacity as a director, officer, trustee or agent or in any other capacity while serving as a director, officer, trustee or agent, shall be indemnified and held harmless by the Corporation to the fullest extent authorized by the Delaware General Corporation Law, as the same exists or may hereafter be amended (but, in the case of any such amendment, only to the extent that such amendment permits the Corporation to provide broader indemnification rights than such law permitted the Corporation to provide prior to such amendment), against all expense, liability and loss (including attorneys' fees, judgments, fines, ERISA excise taxes or penalties and amounts paid in settlement) reasonably incurred or suffered by such Indemnitee in connection therewith.

2. Notwithstanding any other provision in this Article VIII, the Corporation shall not be obligated under this Article VIII to make any indemnity in connection with any claim made against an Indemnitee:

- a. to the extent expressly prohibited by applicable law;
- b. for which payment has actually been made to Indemnitee under a valid and collectible insurance policy or under a valid and enforceable indemnity clause, bylaw or agreement of the Corporation or any other company or organization on whose board Indemnitee serves at the request of the Corporation, except with respect to any deductible (or the equivalent) from or excess beyond the amount payable or paid under any insurance policy or other indemnity provision;
- c. for an accounting of profits made (i) from the purchase and sale (or sale and purchase) by the Indemnitee of securities of the Corporation within the meaning of Section 16(b) of the Securities Exchange Act of 1934, as amended, or similar provisions of state statutory law or common law, or (ii) from any transactions prohibited under Section 306(a) of the Sarbanes-Oxley Act of 2002; or
- d. in connection with any Proceeding (or any part of any Proceeding), including claims and counterclaims, initiated or brought voluntarily by the Indemnitee, including any Proceeding (or any part of any Proceeding) initiated by such Indemnitee against the Corporation or its directors, officers, employees or other Indemnitees in their capacity as such, unless (i) the Proceeding is brought pursuant to Section C of this Article VIII with respect to the enforcement of rights to indemnification under this Article, (ii) the Board of Directors authorized the Proceeding (or such part of any Proceeding) prior to its initiation or (iii) the Corporation elects to provide the indemnification, in its sole discretion, pursuant to the powers vested in the Corporation under applicable law.

B. Right to Advancement of Expenses. In addition to the right to indemnification conferred in Section B of this Article VIII, an Indemnitee shall also have the right to be paid by the Corporation the expenses (including attorney's fees) incurred in defending



any such Proceeding in advance of its final disposition (hereinafter an “**advancement of expenses**”); *provided, however*, that, if the Delaware General Corporation Law requires, an advancement of expenses incurred by an Indemnitee in his or her capacity as a director or officer (and not in any other capacity in which service was or is rendered by such Indemnitee, including, without limitation, service to an employee benefit plan) shall be made only upon delivery to the Corporation of an undertaking (hereinafter an “**undertaking**”), by or on behalf of such Indemnitee, to repay all amounts so advanced if it shall ultimately be determined by final judicial decision from which there is no further right to appeal (hereinafter a “**final adjudication**”) that such Indemnitee is not entitled to be indemnified for such expenses under this Section B or otherwise. Notwithstanding the foregoing, the Corporation shall not be required to advance any expenses to an Indemnitee in the event and to the extent that such Indemnitee has entered a plea of guilty in the applicable criminal Proceeding.

C. Right of Indemnitee to Bring Suit. If a claim under Section A or B of this Article VIII is not paid in full by the Corporation within 60 days after a written claim has been received by the Corporation, except in the case of a claim for an advancement of expenses, in which case the applicable period shall be 20 days, the Indemnitee may at any time thereafter bring suit against the Corporation to recover the unpaid amount of the claim. If successful in whole or in part in any such suit, or in a suit brought by the Corporation to recover an advancement of expenses pursuant to the terms of an undertaking, the Indemnitee shall be entitled to be paid also the expense of prosecuting or defending such suit. In (a) any suit brought by the Indemnitee to enforce a right to indemnification hereunder (but not in a suit brought by the Indemnitee to enforce a right to an advancement of expenses) it shall be a defense that the Indemnitee has not met any applicable standard for indemnification set forth in the Delaware General Corporation Law, and (b) in any suit brought by the Corporation to recover an advancement of expenses pursuant to the terms of an undertaking, the Corporation shall be entitled to recover such expenses upon a final adjudication that the Indemnitee has not met any applicable standard for indemnification set forth in the Delaware General Corporation Law. Neither the failure of the Corporation (including its directors who are not parties to such action, a committee of such directors, independent legal counsel, or its stockholders) to have made a determination prior to the commencement of such suit that indemnification of the Indemnitee is proper in the circumstances because the Indemnitee has met the applicable standard of conduct set forth in the Delaware General Corporation Law, nor an actual determination by the Corporation (including its directors who are not parties to such action, a committee of such directors, independent legal counsel, or its stockholders) that the Indemnitee has not met such applicable standard of conduct, shall create a presumption that the Indemnitee has not met the applicable standard of conduct or, in the case of such a suit brought by the Indemnitee, be a defense to such suit. In any suit brought by the Indemnitee to enforce a right to indemnification or to an advancement of expenses hereunder, or brought by the Corporation to recover an advancement of expenses pursuant to the terms of an undertaking, the burden of proving that the Indemnitee is not entitled to be indemnified, or to such advancement of expenses, under this Article VIII or otherwise shall be on the Corporation.

D. Non-Exclusivity of Rights. The rights to indemnification and to the advancement of expenses conferred in this Article VIII shall not be exclusive of any other right which any person may have or hereafter acquire under any statute, the Corporation’s Certificate of Incorporation, Bylaws, agreement, vote of stockholders or directors or otherwise.



E. Insurance. The Corporation may maintain insurance, at its expense, to protect itself and/or any director, officer, employee or agent of the Corporation or another corporation, partnership, joint venture, trust or other enterprise against any expense, liability or loss, whether or not the Corporation would have the power to indemnify such person against such expense, liability or loss under the Delaware General Corporation Law.

F. Indemnification of Employees and Agents of the Corporation. The Corporation may, to the extent authorized from time to time by the Board of Directors, grant rights to indemnification and to the advancement of expenses to any employee or agent of the Corporation (or any of its direct or indirect subsidiaries or affiliates) who does not qualify for indemnification as an Indemnitee under this Article VIII to the fullest extent of the provisions of this Article with respect to the indemnification and advancement of expenses of directors and executive officers of the Corporation.

G. Nature of Rights. The rights conferred upon Indemnitees in this Article VIII shall be contract rights and such rights shall continue as to an Indemnitee who has ceased to be a director, officer or trustee and shall inure to the benefit of the Indemnitee's heirs, executors and administrators. Any amendment, alteration or repeal of this Article VIII that adversely affects any right of an Indemnitee or its successors shall be prospective only and shall not limit or eliminate any such right with respect to any Proceeding involving any occurrence or alleged occurrence of any action or omission to act that took place prior to such amendment or repeal.

H. Certain Definitions. For purposes of this Article VIII, the following terms shall be defined as follows:

1. **"executive officer"** shall mean (a) any officer of the Corporation with a position of senior vice president (or, if applicable, executive vice president) or higher; or (b) any other officer of the Corporation who is expressly designated by a resolution of the Board of Directors as an "executive officer" for purposes of this Article (regardless of whether such person is designated as an executive officer for other purposes). If an individual is designated an "executive officer" by virtue of clause (a) or (b) of this Section H.1, and the Board of Directors subsequently ceases to designate such individual as an "executive officer," such individual shall continue to be treated as an "executive officer" with respect to any Proceeding involving any occurrence or alleged occurrence of any action or omission to act that took place a period when such individual was an "executive officer" pursuant to clause (a) or (b) of this Section H.1.

2. **"Proceeding"** includes any threatened, pending or completed action, suit, arbitration, alternate dispute resolution mechanism, investigation, inquiry, administrative or legislative hearing or any other actual, threatened or completed proceeding, including any and all appeals, whether brought in the right of the Corporation or otherwise and whether of a civil, criminal, administrative or investigative nature, in which Indemnitee was involved, or becomes or may become involved, as a party or otherwise, for which indemnification is not prohibited under Section A.2 of this Article VIII, including, but not limited to, actions, suits or proceedings in which Indemnitee may be or may have been involved as a party or otherwise, by reason of the



fact that Indemnitee is or was a director, officer, employee or agent of the Corporation, or is or was serving, at the request of the Corporation, as a director, officer, employee or agent or fiduciary of any other entity, including, but not limited to, another corporation, partnership, joint venture, trust, employee benefit plan or other enterprise, or by reason of anything done or not done by Indemnitee in any such capacity, whether or not Indemnitee is serving in such capacity at the time any liability or expense is incurred for which indemnification, reimbursement or advancement of expenses can be provided under this Article VIII.

I. Constituent Corporations. For the purposes of this Article VIII, references to the "Corporation" include all constituent corporations absorbed in a consolidation or merger as well as the resulting or surviving corporation, so that any person who is or was a director or officer, employee or agent of such a constituent corporation or is or was serving at the request of such constituent corporation as a director, officer, employee or agent of another corporation, partnership, joint venture, trust or other enterprise shall stand in the same position under the provisions of this Article VIII with respect to the resulting or surviving corporation as he would if he had served the resulting or surviving corporation in the same capacity.

#### **ARTICLE IX CORPORATE POWER**

The Corporation reserves the right to amend, alter, change or repeal any provision contained in this Certificate of Incorporation, in the manner now or hereafter prescribed by statute, and all rights conferred on stockholders herein are granted subject to this reservation.

#### **ARTICLE X NO STOCKHOLDER ACTION BY WRITTEN CONSENT**

No action required to be taken or which may be taken at any meeting of the stockholders of the Corporation may be taken without a meeting, and the power of stockholders to consent in writing without a meeting to the taking of any action is denied.

#### **ARTICLE XI CREDITOR COMPROMISE OR ARRANGEMENT**

Whenever a compromise or arrangement is proposed between the Corporation and its creditors or any class of them and/or between the Corporation and its stockholders or any class of them, any court of equitable jurisdiction within the State of Delaware may, on the application in a summary way of the Corporation or of any creditor or stockholder thereof or on the application of any receiver or receivers appointed for the Corporation under the provisions of Section 291 of Title 8 of the Delaware Code or on the application of trustees in dissolution or of any receiver or receivers appointed for the Corporation under the provisions of Section 279 of Title 8 of the Delaware Code, order a meeting of the creditors or class of creditors, and/or of the stockholders or class of stockholders of the Corporation, as the case may be, to be summoned in such manner as the said court directs. If a majority in number representing three-fourths in value of the

creditors or class of creditors, and/or of the stockholders or class of stockholders of the Corporation, as the case may be, agree to any compromise or arrangement and to any reorganization of the Corporation as a consequence of such compromise or arrangement, the said compromise or arrangement and the said reorganization shall, if sanctioned by the court to which the said application has been made, be binding on all the creditors or class of creditors, and/or on all the stockholders or class of stockholders, of the Corporation, as the case may be, and also on the Corporation.



**IN WITNESS WHEREOF**, the undersigned has executed this Restated Certificate of Incorporation, which has been duly adopted in accordance with Section 242 and 245 of the Delaware General Corporation Law, on June 28, 2005.

**NEUSTAR, INC.**

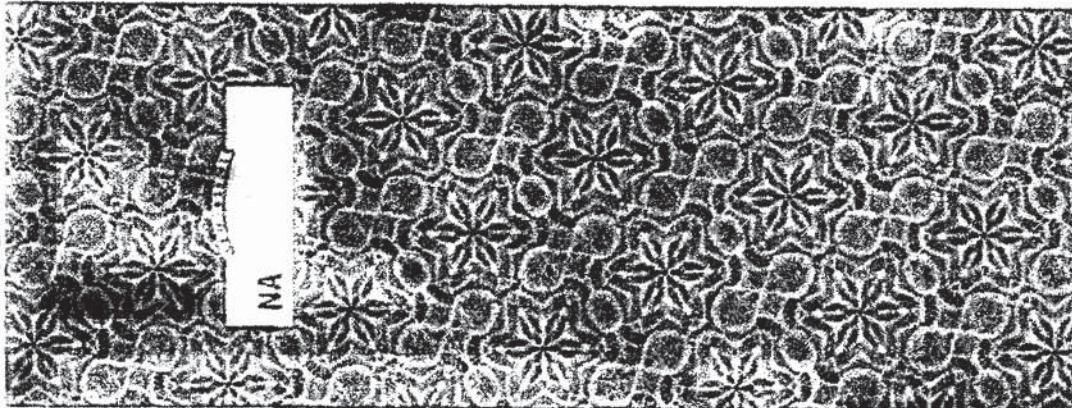
By: /s/ Jeffrey E. Ganek  
Name: Jeffrey E. Ganek  
Title: Chief Executive Officer

REDACTED--FOR PUBLIC INSPECTION

**TAB 3**



020145



# NEUSTAR®

THIS CERTIFICATE IS TRANSFERABLE IN THE CITY OF  
NEW YORK, NEW YORK AND CHANCERY, MARYLAND  
**NEUSTAR, INC.**  
INCORPORATED UNDER THE LAWS OF THE STATE OF DELAWARE  
CLASS A COMMON STOCK

## SPECIMEN

THIS CERTIFICATE IS

to the owner of

FULLY PAID AND NON-ASSESSABLE SHARES OF THE CLASS A COMMON STOCK, PAR VALUE OF \$0.001 PER SHARE, OF  
**NEUSTAR, INC.**

is transferable on the books of the Corporation by the holder hereof in person or by duly authorized attorney upon surrender of this  
Certificate properly endorsed. This Certificate is not valid unless countersigned and registered by the Transfer Agent and Registrar.  
IN WITNESS WHEREOF, said Corporation has caused this Certificate to be signed in facsimile by its duly authorized  
officers, and its Corporate Seal to be affixed as follows:

Dated:

*Jeffrey K. Love*

VICE PRESIDENT



*John De Groot*

CHAIRMAN

SHARES

SEE REVERSE FOR  
CERTIFICATE INFORMATION

CUSIP 64126X 20 1

COUNTERSIGNED AND REGISTERED

WACHOVIA BANK, N.A.  
CHARTERED, N.C.

TRANSFER AGENT  
AND REGISTRAR

REGISTERED SIGNATURE







The Corporation is authorized to issue more than one class or series of stock. The Corporation will furnish without charge to each stockholder who so requests the powers, designations, preferences and relative, participating, optional or other special rights of each class of stock or series thereof and the qualifications, limitations or restrictions of such preferences and/or rights.

The shares represented by this certificate are subject to restrictions on ownership and transfer set forth in Article IV of the Corporation's Restated Certificate of Incorporation. In addition to certain further restrictions and except as expressly provided in the Corporation's Restated Certificate of Incorporation, no TSP or TSP Affiliate may Beneficially Own shares of the Corporation's Capital Stock equal to, or in excess of, five percent (5.0%) of the voting power of the Corporation, unless such Person is an Excepted Holder (in which case the Excepted Holder Limit shall be applicable). Any Person who Beneficially Owns or attempts to Beneficially Own shares of Capital Stock which causes or will cause a Person to Beneficially Own shares of Capital Stock in excess of or in violation of the above limitations must immediately notify the Corporation if any of the restrictions on transfer or ownership are violated. The holder of the shares of Capital Stock represented hereby will be required to sell excess shares immediately either to the Corporation or its designee (at the Corporation's election) or to another Person whose Beneficial Ownership of such shares will not violate such restrictions on transfer or ownership. All capitalized terms in this legend have the meanings defined in the Corporation's Restated Certificate of Incorporation, as the same may be amended from time to time; a copy of which, including the restrictions on transfer and ownership, will be furnished to each holder of Capital Stock of the Corporation on request and without charge. Requests for such a copy may be directed to the Secretary of the Corporation at its principal office.

The following abbreviations, when used in the inscription on the face of this certificate, shall be construed as though they were written out in full according to applicable laws or regulations:

TEN COM = as tenants in common

UNIFORM ACT = \_\_\_\_\_ Custodian \_\_\_\_\_  
(Child) (Minor)

TEN ENT = as tenants by the entirety

under Uniform Gifts to Minors

IT TEN = as joint tenants with right of  
survivorship and not as tenants  
in common

Act \_\_\_\_\_  
(Sign)

Additional abbreviations may also be used though not in the above list.

*For value received, \_\_\_\_\_ hereby sell, assign and transfer with*

PLEASE PRINT SOCIAL SECURITY OR OTHER  
IDENTIFYING NUMBER OF ASSIGNEE

\_\_\_\_\_

PLEASE PRINT OR TYPEWRITE NAME AND ADDRESS, INCLUDING ZIP CODE OF ASSIGNEE

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

*\_\_\_\_\_ shares  
of the capital stock represented by the within Certificate, and do  
hereby irrevocably constitute and appoint*

*\_\_\_\_\_ Attorney  
to transfer the said stock on the books of the within named  
Corporation with full power of substitution in the premises.*

*Dated \_\_\_\_\_*

NOTICE: The signatures to this Assignment must correspond with the name as printed upon the face of the Certificate in every particular, without alteration or enlargement or any change whatsoever.

Signature(s) Guaranteed

THE SIGNATURE(S) MUST BE GUARANTEED BY AN ELIGIBLE GUARANTOR INSTITUTION  
BANK, STOCKBROKERS, SAVINGS AND LOAN ASSOCIATIONS AND CREDIT UNIONS WITH  
MEMBERSHIP IN AN APPROVED SIGNATURE GUARANTEE MEDALLION PROGRAM PURSUANT  
TO SEC RULE 15C2-11

KEEP THIS CERTIFICATE IN A SAFE PLACE. IF IT IS LOST, STOLEN, MUTILATED OR DESTROYED, THE CORPORATION WILL REQUIRE A BOND OF INDEMNITY AS A CONDITION TO THE ISSUANCE OF A REPLACEMENT CERTIFICATE.





[FACE OF CERTIFICATE]

NUMBER

NA

[LOGO]

THIS CERTIFICATE IS TRANSFERABLE IN THE CITIES OF NEW YORK, NEW YORK AND CHARLOTTE, NORTH CAROLINA

NEUSTAR, INC.

INCORPORATED UNDER THE LAWS OF THE STATE OF DELAWARE

CLASS A COMMON STOCK

SHARES

SEE REVERSE FOR CERTAIN DEFINITIONS

CUSIP 64126X 20 1

THIS CERTIFIES that

is the owner of

FULLY PAID AND NON-ASSESSABLE SHARES OF THE CLASS A COMMON STOCK, PAR VALUE OF \$0.001 PER SHARE, OF

NEUSTAR, INC.

transferable on the books of the Corporation by the holder hereof in person or by duly authorized attorney upon surrender of this Certificate properly endorsed. This Certificate is not valid unless countersigned and registered by the Transfer Agent and Registrar.

IN WITNESS WHEREOF, said Corporation has caused this Certificate to be signed in facsimile by its duly authorized officers, and its Corporate Seal to be affixed in facsimile.

Dated:

SECRETARY

/s/

[SEAL]

/s/

CHAIRMAN

COUNTERSIGNED AND REGISTERED:

WACHOVIA BANK, N.A.

(CHARLOTTE, N.C.)

TRANSFER AGENT AND REGISTRAR

BY

AUTHORIZED SIGNATURE

[REVERSE OF CERTIFICATE]

The Corporation is authorized to issue more than one class or series of stock. The Corporation will furnish without charge to each stockholder who so requests the powers, designations, preferences and relative, participating, optional or other special rights of each class of stock or series thereof and the qualifications, limitations or restrictions of such preferences and/or rights.

The shares represented by this certificate are subject to restrictions on ownership and transfer set forth in Article IV of the Corporation's Restated Certificate of Incorporation. In addition to certain further restrictions and except as expressly provided in the Corporation's Restated Certificate of Incorporation, no TSP or TSP Affiliate may Beneficially Own shares of the Corporation's Capital Stock equal to, or in excess of, five percent (5.0%) of the voting power of the Corporation, unless such Person is an Excepted Holder (in which case the Excepted Holder Limit shall be applicable). Any Person who Beneficially Owns or attempts to Beneficially Own shares of Capital Stock which causes or will cause a Person to Beneficially Own shares of Capital Stock in excess or in violation of the above limitations must immediately notify the Corporation. If any of the restrictions on transfer or ownership are violated, the holder of the shares of Capital Stock represented hereby will be required to sell excess shares immediately either to the Corporation or its designee (at the

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Corporation's election) or to another Person whose Beneficial Ownership of such shares will not violate such restrictions on transfer or ownership. All capitalized terms in this legend have the meanings defined in the Corporation's Restated Certificate of Incorporation, as the same may be amended from time to time, a copy of which, including the restrictions on transfer and ownership, will be furnished to each holder of Capital Stock of the Corporation on request and without charge. Requests for such a copy may be directed to the Secretary of the Corporation at its principal office.

The following abbreviations, when used in the inscription on the face of this certificate, shall be construed as though they were written out in full according to applicable laws or regulations:

TEN COM - as tenants in common

TEN ENT - as tenants by the entireties

JT TEN - as joint tenants with right of survivorship and not as tenants in common

UNIF GIFT MIN ACT-

(Cust) Custodian (Minor) under Uniform Gifts to Minors Act (State)

Additional abbreviations may also be used though not in the above list.

For value received, hereby sell, assign and transfer unto

PLEASE INSERT SOCIAL SECURITY OR OTHER IDENTIFYING NUMBER OF ASSIGNEE

(PLEASE PRINT OR TYPEWRITE NAME AND ADDRESS, INCLUDING ZIP CODE, OF ASSIGNEE)

shares of the capital stock represented by the within Certificate, and do hereby irrevocably constitute and appoint

Attorney to transfer the said stock on the books of the within named Corporation with full power of substitution in the premises.

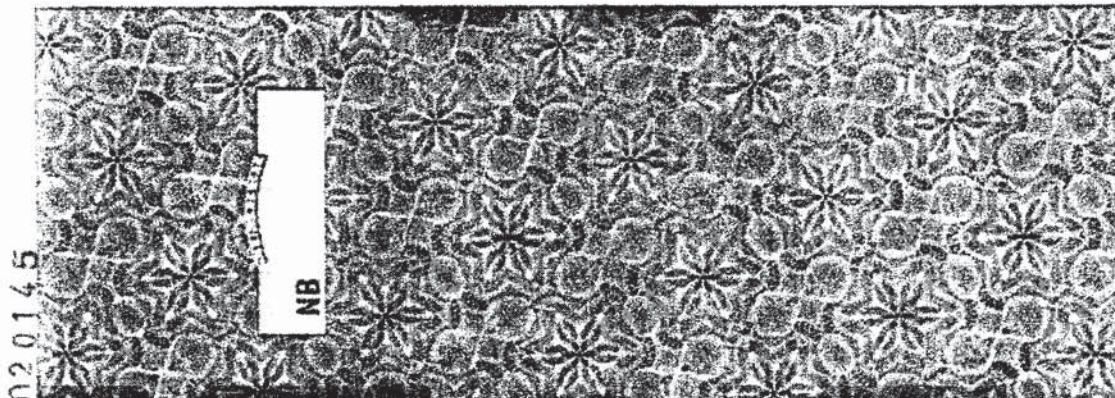
Dated

NOTICE: THE SIGNATURE TO THIS ASSIGNMENT MUST CORRESPOND WITH THE NAME AS WRITTEN UPON THE FACE OF THE CERTIFICATE IN EVERY PARTICULAR, WITHOUT ALTERATION OR ENLARGEMENT OR ANY CHANGE WHATSOEVER.

Signature(s) Guaranteed:

THE SIGNATURE(S) MUST BE GUARANTEED BY AN ELIGIBLE GUARANTOR INSTITUTION (BANKS, STOCKBROKERS, SAVINGS AND LOAN ASSOCIATIONS AND CREDIT UNIONS WITH MEMBERSHIP IN AN APPROVED SIGNATURE GUARANTEE MEDALLION PROGRAM), PURSUANT TO S.E.C. RULE 17Ad-15.

KEEP THIS CERTIFICATE IN A SAFE PLACE. IF IT IS LOST, STOLEN, MUTILATED OR DESTROYED, THE CORPORATION WILL REQUIRE A BOND OF INDEMNITY AS A CONDITION TO THE ISSUANCE OF A REPLACEMENT CERTIFICATE.



**NEUSTAR®**

**NEUSTAR, INC.**  
INCORPORATED UNDER THE LAWS OF THE STATE OF DELAWARE  
**CLASS B COMMON STOCK**

**SPECIMEN**

THIS CERTIFIES THAT

is the owner of

FULLY PAID AND NON-ASSESSABLE SHARES OF THE CLASS B COMMON STOCK, PAR VALUE OF \$0.001 PER SHARE, OF  
**NEUSTAR, INC.**

transferable on the books of the Corporation by the holder hereof in person or by duly authorized agency upon surrender of this Certificate properly endorsed. This Certificate is not valid unless countersigned and registered by the Transfer Agent and Registrar.  
**IN WITNESS WHEREOF,** said Corporation has caused this Certificate to be signed in facsimile by its duly authorized officers, and its Corporate Seal to be affixed in facsimile.

Date:

*Mark K. Love*

2013.04.17



*Charles E. Gault*

2013.04.17

AUTHORIZED SIGNATURE

TRANSFER AGENT  
AND REGISTRAR

COUNTERSIGNED AND REGISTERED  
BACHMANN BANK, N.A.  
CHARTERED, N.Y.

COUNTERSIGNED AND REGISTERED

SHARES

SEE NEUSTAR FOR  
ESTIMATE OF PAR VALUE









The Corporation is authorized to issue more than one class or series of stock. The Corporation will furnish without charge to each stockholder who so requests the powers, designations, preferences and relative, participating, optional or other special rights of each class of stock or series thereof and the qualifications, limitations or restrictions of such preferences and/or rights.

The shares represented by this certificate are subject to restrictions on ownership and transfer set forth in Article IV of the Corporation's Restated Certificate of Incorporation. In addition to certain further restrictions and except as expressly provided in the Corporation's Restated Certificate of Incorporation, no TSP or TSP Affiliate may Beneficially Own shares of the Corporation's Capital Stock equal to, or in excess of, five percent (5%) of the voting power of the Corporation, unless such Person is an Excepted Holder (in which case the Excepted Holder Limit shall be applicable). Any Person who Beneficially Owns or attempts to Beneficially Own shares of Capital Stock which causes or will cause a Person to Beneficially Own shares of Capital Stock in excess of or in violation of the above limitations must immediately notify the Corporation of any of the restrictions on transfer or ownership are violated; the holder of the shares of Capital Stock represented hereby will be required to sell excess shares immediately either to the Corporation or its designee (at the Corporation's election) or to another Person whose beneficial ownership of such shares will not violate such restrictions on transfer or ownership. As capitalized terms in this legend have the meanings defined in the Corporation's Restated Certificate of Incorporation, as the same may be amended from time to time, a copy of which, including the restrictions on transfer and ownership, will be furnished to each holder of Capital Stock of the Corporation on request and without charge. Requests for such a copy may be directed to the Secretary of the Corporation at its principal office.

The following abbreviations, when used in the description on the face of this certificate, shall be construed as though they were written out in full according to applicable laws or regulations:

TEN COM = as terms in common  
TEN ENT = as terms in the certificate  
TEN TEN = as terms with right of  
superiorship and not as terms  
in common

UNIF GIFT MIN ACT = Uniform Gifts to Minors  
Act  
Canadian = Canadian  
(None)

Additional abbreviations may also be used though not in the above list.

*To value received, hereby sell, assign and transfer unto*

JOHN J. HART (HART) (HART) OR OTHER  
CERTAIN NUMBER OF SHARES

PLEASE PRINT OR TYPEWRITE NAME AND ADDRESS, INCLUDING ZIP CODE, OF HOLDER

*shares  
of the capital stock represented by the within Certificate, and do  
hereby irrevocably constitute and appoint*

*Attorney  
to transfer the said stock on the books of the within named  
Corporation with full power of substitution in the premises.*

*Dated*

NOTICE: THE SIGNATURE OF THE CORPORATION MUST BE VERIFIED WITH THE SIGNATURE OF THE SECRETARY OF THE CORPORATION OR THE ATTORNEY AT LAW OF THE CORPORATION.

Signature of Guarantors

THIS CERTIFICATE MUST BE GUARANTEED BY AN ELIGIBLE GUARANTOR FOR FUTURE  
REDEMPTION THROUGH THE BANK OF AMERICA AND OTHER FINANCIAL INSTITUTIONS  
PARTICIPATING IN AN APPROVED SIGNATURE GUARANTEE MEDIAN PROGRAM. PURSUANT  
TO 17 CFR 201.104-10

KEEP THIS CERTIFICATE IN A SAFE PLACE. IF IT IS LOST, STOLEN, MUTILATED OR DESTROYED THE CORPORATION WILL  
REQUIRE A BOND OF INDEMNITY AS A CONDITION TO THE ISSUANCE OF A REPLACEMENT CERTIFICATE.





[FACE OF CERTIFICATE]

NUMBER

NB

[LOGO]

NEUSTAR, INC.

INCORPORATED UNDER THE LAWS OF THE STATE OF DELAWARE

CLASS B COMMON STOCK

SHARES

SEE REVERSE FOR CERTAIN DEFINITIONS

THIS CERTIFIES that

is the owner of

FULLY PAID AND NON-ASSESSABLE SHARES OF THE CLASS B COMMON STOCK, PAR VALUE OF \$0.001 PER SHARE, OF

NEUSTAR, INC.

transferable on the books of the Corporation by the holder hereof in person or by duly authorized attorney upon surrender of this Certificate properly endorsed. This Certificate is not valid unless countersigned and registered by the Transfer Agent and Registrar.

IN WITNESS WHEREOF, said Corporation has caused this Certificate to be signed in facsimile by its duly authorized officers, and its Corporate Seal to be affixed in facsimile.

Dated:

/s/

SECRETARY

[SEAL]

/s/

CHAIRMAN

COUNTERSIGNED AND REGISTERED:

WACHOVIA BANK, N.A.

(CHARLOTTE, N.C.)

TRANSFER AGENT AND REGISTRAR

BY

AUTHORIZED SIGNATURE

[REVERSE OF CERTIFICATE]

The Corporation is authorized to issue more than one class or series of stock. The Corporation will furnish without charge to each stockholder who so requests the powers, designations, preferences and relative, participating, optional or other special rights of each class of stock or series thereof and the qualifications, limitations or restrictions of such preferences and/or rights.

The shares represented by this certificate are subject to restrictions on ownership and transfer set forth in Article IV of the Corporation's Restated Certificate of Incorporation. In addition to certain further restrictions and except as expressly provided in the Corporation's Restated Certificate of Incorporation, no TSP or TSP Affiliate may Beneficially Own shares of the Corporation's Capital Stock equal to, or in excess of, five percent (5.0%) of the voting power of the Corporation, unless such Person is an Excepted Holder (in which case the Excepted Holder Limit shall be applicable). Any Person who Beneficially Owns or attempts to Beneficially Own shares of Capital Stock which causes or will cause a Person to Beneficially Own shares of Capital Stock in excess or in violation of the above limitations must immediately notify the Corporation. If any of the restrictions on transfer or ownership are violated, the holder of the shares of Capital Stock represented hereby will be required to sell excess shares immediately either to the Corporation or its designee (at the Corporation's election) or to another Person whose Beneficial Ownership of such shares will not violate such restrictions on transfer or ownership. All capitalized terms in this legend have the meanings defined in the Corporation's

---

Restated Certificate of Incorporation, as the same may be amended from time to time, a copy of which, including the restrictions on transfer and ownership, will be furnished to each holder of Capital Stock of the Corporation on request and without charge. Requests for such a copy may be directed to the Secretary of the Corporation at its principal office.

The following abbreviations, when used in the inscription on the face of this certificate, shall be construed as though they were written out in full according to applicable laws or regulations:

TEN COM - as tenants in common

TEN ENT - as tenants by the entireties

JT TEN - as joint tenants with right of survivorship and not as tenants in common

UNIF GIFT MIN ACT-

(Cust) Custodian (Minor) under Uniform Gifts to Minors Act (State)

Additional abbreviations may also be used though not in the above list.

For value received, hereby sell, assign and transfer unto

PLEASE INSERT SOCIAL SECURITY OR OTHER IDENTIFYING NUMBER OF ASSIGNEE

(PLEASE PRINT OR TYPEWRITE NAME AND ADDRESS, INCLUDING ZIP CODE, OF ASSIGNEE)

shares of the capital stock represented by the within Certificate, and do hereby irrevocably constitute and appoint

Attorney to transfer the said stock on the books of the within named Corporation with full power of substitution in the premises.

Dated

NOTICE: THE SIGNATURE TO THIS ASSIGNMENT MUST CORRESPOND WITH THE NAME AS WRITTEN UPON THE FACE OF THE CERTIFICATE IN EVERY PARTICULAR, WITHOUT ALTERATION OR ENLARGEMENT OR ANY CHANGE WHATSOEVER.

Signature(s) Guaranteed:

THE SIGNATURE(S) MUST BE GUARANTEED BY AN ELIGIBLE GUARANTOR INSTITUTION (BANKS, STOCKBROKERS, SAVINGS AND LOAN ASSOCIATIONS AND CREDIT UNIONS WITH MEMBERSHIP IN AN APPROVED SIGNATURE GUARANTEE MEDALLION PROGRAM), PURSUANT TO S.E.C. RULE 17Ad-15. KEEP THIS CERTIFICATE IN A SAFE PLACE. IF IT IS LOST, STOLEN, MUTILATED OR DESTROYED, THE CORPORATION WILL REQUIRE A BOND OF INDEMNITY AS A CONDITION TO THE ISSUANCE OF A REPLACEMENT CERTIFICATE.

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REDACTED--FOR PUBLIC INSPECTION

Link to EDGAR version of the Class A Common Stock Certificate, which shows the legends. These legends appear on certificated shares only.

[http://www.sec.gov/Archives/edgar/data/1265888/000104746905018239/a2160129zex-4\\_1.htm](http://www.sec.gov/Archives/edgar/data/1265888/000104746905018239/a2160129zex-4_1.htm)

Link to EDGAR version of the Class B Common Stock Certificate, which shows the legends. These legends appear on certificated shares only.

[http://www.sec.gov/Archives/edgar/data/1265888/000104746905018239/a2160129zex-4\\_2.htm](http://www.sec.gov/Archives/edgar/data/1265888/000104746905018239/a2160129zex-4_2.htm)

REDACTED--FOR PUBLIC INSPECTION

**TAB 4**



REDACTED—FOR PUBLIC INSPECTION

# HIGHLY CONFIDENTIAL

REDACTED—FOR PUBLIC INSPECTION

# HIGHLY CONFIDENTIAL



REDACTED--FOR PUBLIC INSPECTION

## **TAB 5**

## NEUSTAR CODE OF CONDUCT

1. NeuStar will never, directly or indirectly, show any preference or provide any special consideration to any company that is a telecommunications service provider, which term as used herein shall have the meaning set forth in the Telecommunications Act of 1996.
2. No shareholder of NeuStar shall have access to user data or proprietary information of the telecommunications service providers served by NeuStar (other than access of employee-shareholders of NeuStar that is incident to the performance of NANPA and LNPA duties).
3. Shareholders of NeuStar will ensure that no user data or proprietary information from any telecommunications service provider is disclosed to NeuStar (other than the sharing of data incident to the performance of NANPA and LNPA duties).
4. Confidential information about NeuStar's business services and operations will not be shared with employees of any telecommunications service provider. NeuStar shareholders will guard their knowledge and information about NeuStar's operations as they would their own proprietary information.
5. No person employed by, or serving in the management of any shareholder of NeuStar will be directly involved in the day-to-day operations of NeuStar. No employees of any company that is a telecommunications service provider will be simultaneously employed (full-time or part-time) by NeuStar.
6. Warburg Pincus will not control more than 40% of NeuStar's Board.
7. No member of NeuStar's board will simultaneously serve on the board of a telecommunications services provider.
8. No employee of NeuStar will hold any interest, financial or otherwise, in any company that would violate the neutrality requirements of the FCC or the NPAC Contractor Services Agreements (the Master Agreements).
9. NeuStar will hire an independent party to conduct a neutrality review of NeuStar, ensuring that NeuStar and its shareholders comply with all the provisions of this Code of Conduct. The neutrality analyst will be mutually agreed upon by NeuStar, the FCC, NANC and the LLCs. The neutrality review will be conducted quarterly. NeuStar will pay the expenses of conducting the review. NeuStar will provide the analyst with reasonable access to information and records necessary to complete the review. The results of the review will be provided to the LLCs, to the North American Numbering Council and to the FCC and shall be deemed to be confidential and proprietary information of NeuStar and its shareholders.





**EXHIBIT A**

1. Does NeuStar, in its operation of the NPAC, provide services under non-discriminatory terms, rates, and conditions?
2. Does NeuStar qualify as a NPAC User as defined in the Master Agreement and as further defined by the criteria used to grant User status to any entity?
3. Do the services provided by NeuStar in the operations of non-NPAC businesses, utilize User Data not available to any other User?
4. In its operations of non-NPAC businesses, is NeuStar's use of the NPAC data consistent with the intended uses as described in the Master Agreement?
5. Are the services provided by the non-NPAC businesses possible only because NeuStar operates the NPAC?
6. Does NeuStar in the operations of non-NPAC businesses disclose any NPAC data to any entity that would otherwise not be eligible to receive it?
7. Does NeuStar maintain neutrality in public forums, not favoring the positions of an industry segment or segments, or an industry member or members, over others, as demonstrated in the records of public forums and ex-parte meetings?

# NeuStar Business Continuity Plan

**neustar**<sup>TM</sup>



	<b>Doc Title:</b>	<i>NeuStar Business Continuity Plan</i>		
	<b>Doc Number:</b>	NEU-00001		
	<b>Doc Revision:</b>	2.4		
<b>Revision Control</b>				
<b>Revision</b>	<b>Release Date</b>	<b>Author</b>	<b>Description of Changes</b>	
1.0		Security-Related Information	Initial Release	
2.0		Security-Related Information	Updated to reflect separation of the Plan and Runbook	
2.1		Security-Related Information	Updated to reflect edits	
2.2		Security-Related Information	Updated to reflect edits	
2.3		Security-Related Info	Updated to reflect edits	
2.4	6/18/2012	Security-Related Info	Updated <b>Security-Related Information</b>	
<b>Document Approvals of Current Revision</b>				
<b>Name:</b>		<b>Position/Title/Role</b>		
Alex Tulchinsky		Senior Vice-President of Operations (Or Designate)		
Send all Questions, Suggestions and Recommendations regarding the content of this document to				
<p>The information contained herein is proprietary to NeuStar, Inc. Unauthorized reproduction or disclosure of this information in whole or in part is strictly prohibited. Limit distribution accordingly.</p> <p>The names, logos, and taglines identifying NeuStar's products and services are proprietary marks of NeuStar, Inc. All other trademarks and service marks are the property of their respective owners. © NeuStar, Inc. 1999-2013</p>				

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# 1 Introduction

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## 1.1 Purpose and Scope

This Business Continuity Plan (aka “the Plan”) provides a roadmap to prepare for and respond to a range of potential emergencies/disasters relating to the people, data and facilities that comprise NeuStar’s business assets.

The Plan provides a description of the overall disaster/emergency response actions. They designate responsibilities, interface between organizations, and notification procedures necessary to cope with all aspects of disasters.

The Plan identifies the critical functions of NeuStar and the resources required to support them. The Plan provides guidelines for ensuring that needed personnel and resources are available for both disaster preparation and response. Supplementary information, including supporting teams and structures, external first-responder information, and communications resources are documented and maintained in the BCP Supplement.

## 1.2 Assumptions

The Plan is predicated on the validity of the following five assumptions:

- **Security-Related Information**

## 1.3 Plan Development

The Business Continuity Management Team (BCMT), with assistance from key internal support organizations and personnel, is responsible for developing the Plan. Development and support of individual product/platform disaster recovery plans are



the responsibility of the respective functional area. See Table 5.1-1, Team Organization.

## 1.4 Plan Maintenance

The BCMT is responsible for updating the Plan; testing the updated Plan; and training personnel.

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Security-Related Information, the BCMT initiates a complete review of the Plan. Revisions are distributed to all authorized personnel.

## 1.5 Plan Testing

The Plan is Security-Related Information. The results are documented and evaluated for Plan updates.

# 2 Assessing Business Risk and Impact of Potential Emergencies

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A key part of the BCP process is the assessment of potential risks to the business that could result from disasters or emergency situations. The purpose of hazard identification and risk assessment is to determine:

- (1) the events and environmental surroundings that can adversely affect NeuStar facilities by disruption as well as disaster
- (2) the damage such events can cause, and the controls needed to prevent or minimize the effects of potential loss.

## 2.1 Emergency Incident Assessment

The hazards and threats facing NeuStar and its data centers are those common to telecommunications companies of its size and location. These include, but are not limited to, the following:

- **Security-Related Information**

- **Security-Related Information**

The hazard identification and risk assessment determines what can occur, when and how often it is likely to occur, and how significant the effects could be. The hazard identification includes the types of hazards presented in the following subsections.

### 2.1.1 Environmental Disasters

The following are the natural events that have been considered as part of hazard identification.

*Table 2.1-1. Environmental Disasters*

Incident	Description	Assessment
Tornado	Tornadoes are tight columns of circling air creating a funnel shape. The wind forces within the tornado can reach over 200 miles per hour. Tornadoes can often travel in excess of 50 miles per hour. They can cause significant structural damage and can also cause severe injuries and death.	Possible but not frequent. Immediate power supply to <small>Security-Related</small> sites is underground.
Hurricane	Hurricanes are storms with heavy circular winds exceeding 60 miles per hour. The eye or center of the hurricane is usually calm. The hurricane contains both extremely strong winds and torrential rain. Hurricanes can cause flooding, massive structural damage to homes and business premises with associated power failures, and even injury and death.	<small>Security-Related Information</small> are subject to hurricane-induced weather but are perceived as being far enough inland to avoid the worst affects of these storms.



Incident	Description	Assessment
Flood	Floods result from thunderstorms, tropical storms, snow thaws or heavy and prolonged rainfall causing rivers to overflow their banks and flood the surrounding areas. Floods can seriously affect buildings and equipment causing power failures and loss of facilities and can even result in injury or death.	Drainage/ flooding is not a problem in <a href="#">Security-Related Information</a> .  Air conditioning in <a href="#">Security-Related Information</a> is internal to each data center. Water detection sensors are present at both sites.
Snowstorm	Snowstorm conditions can include blizzards, strong winds and freezing temperatures with significant amounts of snow. Snow and ice can impact power and communications and employees may be unable to travel to work due to the impact on public transport or road conditions. It is possible for buildings to collapse under the weight of snow and injuries or even death could occur through freezing temperatures and icy conditions.	<a href="#">Security-Related Information</a>  are subject to winter ice storms. Snow events are rare in <a href="#">Security-Related Information</a> and relatively infrequent and moderate in <a href="#">Security-Related Information</a> .
Earthquake	Earthquakes are caused by a shifting of the earth's rock plates beneath its surface resulting in violent shaking and movement of the earth's upper surface. Severe earthquakes can destroy power and communication lines and disrupt gas, water and sewerage services. Significant damage to structures can occur including total collapse of buildings, bridges or other elevated structures. Earthquakes can also bring landslides, damage to dams, and aftershocks and resulting damage can hinder rescue efforts. In addition to being trapped in a collapsing building, of particular danger to human life is the possibility of falling glass or other objects.	<a href="#">Security-Related Information</a>  is in an earthquake zone.
Lightning Storms	The impact of lightning strikes can be significant. It can cause disruption to power and can also cause fires. It may also damage electrical equipment including computer systems. Structural damage is also possible through falling trees or other objects.	<a href="#">Security-Related Information</a>  are equipped with both UPS and a backup generator, and both are grounded and surge protected.

Incident	Description	Assessment
Fire	Fires are often devastating and can be started through a wide range of events that may be accidental or environmental. Deliberate fires caused through arson are dealt with in the next section. The impact on the business will vary depending on the severity of the fire and the speed within which it can be brought under control. A fire can cause human injury or death and damage can also be caused to records and equipment and the fabric or structure of premises.	<b>Security-Related Information</b>  is in an environmental fire hazard area.
Subsidence and Landslides	Subsidence and landslides are often caused through a change in the composition of the earth's surface. This change can often result from flooding, where flowing water can create cavernous open areas beneath structures. Subsidence or landslides can cause structural damage and can also disrupt transport services and affect traveling conditions.	<b>Security-Related Information</b>  is in subsidence and landslides hazard environments.

## Security-Related Information

# Security-Related Information



# Security-Related Information

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# Security-Related Information

## 2.1.6 Pandemic

*Table 2.1-6. Pandemic*

Incident	Description	Assessment
Pandemic Event	Pandemic events, while they cannot be predicted, have the potential to affect the health of the human population. Particular to a corporation, pandemic	NeuStar will work with local health officials to contain pandemic events. If quarantined, critical personnel

Incident	Description	Assessment
	events can cause prolonged work absences.	are equipped to work remotely.

### 2.1.7 Loss of Key Personnel

*Table 2.1-7. Loss of Key Personnel*

Incident	Description	Assessment
Loss of Key Personnel	Loss of key personnel can negatively impact the ability to effectively respond and recover from an incident in a timely manner.	NeuStar identifies alternates for key personnel, as well as an order of succession for key positions in the event that primary staff members are unavailable.

## 2.2 Business Risk Assessment

The Business Risk Assessment helps the BCMT assess the criticality of NeuStar's business processes and allows the team to determine operational and financial impact due to loss of services or reduction in service levels.

## 2.3 Business Impact Analysis (BIA)

The BIA enables the Business Continuity and Disaster Recovery Teams to:

- Identify critical systems, processes, functions, and their interdependencies.
- Assess the economic impact of incidents and disasters.
- Develop recovery time objectives.

## 2.4 Critical Business Functions and Recovery Time Objectives (RTO)

The Recovery Time Objective is a measure of the period between a disaster occurring and when the business determines the function must be available. NeuStar's management and staff will need to complete the following tasks during the recovery time periods:

- Respond to the initial event.
- Complete an assessment of the circumstances of the interruption.
- Make an alert/declaration decision if required.
- Notify all staff, key vendors, and key customers.
- Relocate staff to alternate site(s).

- Establish the necessary resources at the alternate site(s).
- Resume critical business functions at an emergency level of service.

*Table 2.4-1. Critical Business Functions and Recovery Time Objectives (RTO)*

Product / Infrastructure	Department	Function	RTO
Corporate Infrastructure	Finance	General Ledger: accounts payable, fixed assets	Security-Related Informa
		Accounts Receivable	Security-Related Infor
		Payroll	Security-Related Informa
		Stock Options	Security-Related Infor
		<i>Billing:</i>	
		LNP Billing	Security-Related Infor
		Registry Billing	Security-Related Infor
		PAS Billing	Security-Related Infor
		CARE Billing	Security-Related Infor
		Identibase Billing	Security-Related Infor
		NANPA Billing	Security-Related Infor
		NTS Billing	Security-Related Infor
	Legal	In House Counsel Contracts Service Agreements Security Policy	Security-Related Informa
	Human Resources	Organization Development Reward and Recognition Benefits Employee Assistance Plan EAP, staff communications	Security-Related Ir
	External Affairs	External Communications with regulatory/policy-making organizations and agencies	Security-Related Ir
	Corporate Communications	External Communications with the public including media, industry analysts, and investors.	Security-Related Ir
	Procurement	Purchasing	Security-Related Infor
	Facilities Management	Mailroom Office Services	Security-Related Ir
<b>Security-Related Information</b>			Security-Related Ir
			Security-Related Ir



Product / Infrastructure	Department	Function	RTO
<b>Security-Related Information</b>			
Enterprise Services	Registry Operations	Customer Service Operational Support	Security-Related Infor
Carrier Services	NPAC Operations	NPAC SMS apps support	Security-Related Information
	NPAC Customer Service	Help Desk	Security-Related Ir
		Customer Outreach	Security-Related Informa
	PAS	Pooling Administration Code Administration	Security-Relater
	OMS LSR (local service request)	LSR operations/apps support, customer service	Security-Related Informa
	CARE	CARE operations/apps support, customer service (handled jointly with LSR)	Security-Related Informa

## 3 Recovery and Restoration Planning

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### 3.1 Recovery Phase

From a business perspective, a critical part of the BCP is the Recovery Phase. This phase deals with activating and failing over to the secondary data center in the shortest possible time to get applications and critical processes back up and running. Recovery steps and secondary site procedures are maintained internally and are specific to each line of business.

### 3.2 Restoration Phase

The time required for recovery of the primary data center and the eventual restoration of normal processing depends on the damage caused by the disaster. The restoration process begins immediately after the disaster and takes place in parallel with recovery operations at the backup site.

The primary goal is to restore normal operations as soon as possible. Restoration steps are stored internally and are specific to each line of business.

## 4 NeuStar Communications Options

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### 4.1 Telephone (Landline)

- Security-Related Information

### 4.2 Telephone (Mobile) or SMS

- Security-Related Information

### 4.3 E-mail

- Security-Related Information

### 4.4 IM

- Security-Related Information

In the event that both Internet and Telecommunications connectivity have been severed, the NOC supervisor on duty will triage the event until appropriate communication can be established. The supervisor on-duty will assign the role of communication liaison to one member of the team, who will be responsible for contacting senior management by one of the methods above.

### 4.5 GETS, WPS and TSP

NeuStar is an essential infrastructure service provider for the telecommunications industry. In the event of a crisis, NeuStar will have access to extended and enhanced telecommunications services.

Membership for each of these services are reviewed and revised on the same schedule as the Plan, or as needed.



#### **4.5.1 GETS – Government Emergency Telecommunication Service**

The Government Emergency Telecommunications Service (GETS) is an emergency service designed for use when national security and emergency preparedness (NS/EP) personnel are unable to complete emergency calls through their regular telecommunications means. GETS uses a calling card to provide Federal, State, local government, and industry NS/EP users with a higher probability of call completion during periods of natural or man-made disasters or emergencies that cause congestion or network outages. GETS features are implemented as software enhancements to the telephone switches throughout the Public Switched Telephone Network (PSTN).

#### **4.5.2 WPS – Wireless Priority Service**

The goal of the Wireless Priority Service (WPS) is to provide an end-to-end nationwide wireless priority communications capability to key national security and emergency preparedness (NS/EP) personnel during natural or man-made disasters or emergencies that cause congestion or outages in the Public Switched Telephone Network (PSTN). Eligible users (see criteria at <http://wps.ncs.gov>) are key Federal, State, local, and tribal government and critical industry personnel who have NS/EP missions. WPS is complementary to, and can be most effective when used in conjunction with, the Government Emergency Telecommunications Service (GETS) to ensure a high probability of call completions in both the wireline and wireless portions of the PSTN. WPS serves NS/EP communications needs while minimizing impact on consumer access to the public wireless infrastructure.

#### **4.5.3 TSP – Telecommunications Service Priority**

The Telecommunications Service Priority (TSP) Program provides national security and emergency preparedness (NS/EP) users priority authorization of telecommunications services that are vital to coordinating and responding to crises. Telecommunications services are defined as the transmission, emission, or reception of intelligence of any nature, by wire, cable, satellite, fiber optics, laser, radio visual or other electronic, electric, electromagnetic, or acoustically coupled means, or any combination thereof. As a result of hurricanes, floods, earthquakes, and other natural or man-made disasters, telecommunications service vendors may become overwhelmed with requests for new telecommunications services and requirements to restore existing telecommunications services. The TSP Program provides service vendors with a [Federal Communications Commission \(FCC\)](#) mandate for prioritizing service requests by identifying those services critical to NS/EP. A telecommunications service with a TSP assignment is assured of receiving full attention by the service vendor before a non-TSP service.

## Security-Related Information

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Security-Related Information

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## Security-Related Information

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- **Security-Related Information**

- **Security-Related Information**



## Appendix A – NPAC Contractual Obligations

The following Contractor obligations and Customer rights apply in the event of a permanent loss of Contractor's NPAC/SMS Data Centers:

**(a)**      **Security-Related Information**

**(b)**      **Security-Related Information**

# Neustar Code of Conduct

## NEUSTAR CODE OF CONDUCT

1. Neustar will never, directly or indirectly, show any preference or provide any special consideration to any company that is a telecommunications service provider, which term as used herein shall have the meaning set forth in the Telecommunications Act of 1996.
2. No shareholder of Neustar shall have access to user data or proprietary information of the telecommunications service providers served by Neustar (other than access of employee-shareholders of Neustar that is incident to the performance of NANPA and LNPA duties).
3. Shareholders of Neustar will ensure that no user data or proprietary information from any telecommunications service provider is disclosed to Neustar (other than the sharing of data incident to the performance of NANPA and LNPA duties).
4. Confidential information about Neustar's business services and operations will not be shared with employees of any telecommunications service provider. Neustar shareholders will guard their knowledge and information about Neustar's operations as they would their own proprietary information.
5. No person employed by, or serving in the management of any shareholder of Neustar will be directly involved in the day-to-day operations of Neustar. No employees of any company that is a telecommunications service provider will be simultaneously employed (full-time or part-time) by Neustar.
6. Warburg Pincus will not control more than 40% of Neustar's Board.
7. No member of Neustar's board will simultaneously serve on the board of a telecommunications services provider.
8. No employee of Neustar will hold any interest, financial or otherwise, in any company that would violate the neutrality requirements of the FCC or the NPAC Contractor Services Agreements (the Master Agreements).
9. Neustar will hire an independent party to conduct a neutrality review of Neustar, ensuring that Neustar and its shareholders comply with all the provisions of this Code of Conduct. The neutrality analyst will be mutually agreed upon by Neustar, the FCC, NANC and the LLCs. The neutrality review will be conducted quarterly. Neustar will pay the expenses of conducting the review. Neustar will provide the analyst with reasonable access to information and records necessary to complete the review. The results of the review will be provided to the LLCs, to the North American Numbering Council and to the FCC and shall be deemed to be confidential and proprietary information of Neustar and its shareholders.

# CORPORATE CODE OF BUSINESS CONDUCT

## NEUSTAR, INC.



# Summary

The Code of Business Conduct has been adopted by the Board of Directors of Neustar, Inc. to provide standards by which directors, officers, employees and individual contractors providing services to or on behalf of the Company will conduct themselves in order to protect and promote organization-wide integrity and to enhance the Company's ability to achieve its mission.

The Code is designed to give you useful guidance about the way employees are to do business every day. As a representative of Neustar, it is your responsibility to read and understand this Code and to comply with it both in letter and spirit. The Code of Business Conduct applies to all directors, officers, employees and individual contractors providing services to or on behalf of the Company, who, unless otherwise specified, are referred to as "employees." The term "the Company" or "Neustar" means Neustar, Inc. and each of its divisions, subsidiaries and operating or business units unless otherwise specified.

The Code of Business Conduct is in addition to our obligations under the Neustar Code of Conduct, which has been adopted to ensure that Neustar maintains its obligation of neutrality in its business activities, and under other policies set forth in the Neustar employee handbook.

What you will see in the pages that follow are a series of conduct and ethical guidelines. Most of what you will read probably won't surprise you, for the overarching theme of these guidelines can be summed up this way: *As a representative of the Company, you must act with honesty and integrity in all matters.*

*The Company expects each employee to conduct the business and affairs of the Company in a manner consistent with the Code of Business Conduct.*

## General Principles of the Code

**Compliance with Laws.** Employees must follow the law wherever they are around the world.

**Honesty and Integrity.** Employees must accurately and honestly represent the Company and will not engage in any activity or scheme intended to defraud anyone. Employees will act with candor and honesty in their communications with our stockholders and potential investors, and our attorneys and auditors.

**Conflicts of Interest.** Employees should avoid actual and perceived conflicts of interest. All employees owe a duty of undivided and unqualified loyalty to Neustar and should avoid any activity that is or has the appearance of being hostile or adverse to, or competitive with, Neustar or that interferes with the proper performance of their duties, responsibilities or loyalty to Neustar.

**Financial and Business Records.** Financial and business records - both for internal activities and external transactions - must be timely and accurate.

**Use of Company Assets.** Company assets - which include but are not limited to computers, software, materials and work time - must not be used for personal benefit (except for incidental and immaterial personal use of Company assets in accordance with this Code).

**Working with Customers and Suppliers.** Customers and suppliers must be dealt with fairly and with candor and honesty. Avoid excessive or lavish gifts that may give the appearance of undue influence and personal financial transactions with customers and suppliers that may influence your ability to perform your job.

**Working with Governments.** The public trust associated with transactions between the private sector and government entities imposes special responsibilities on Company employees and representatives to adhere to the same high standard of conduct expected of the government employee. Company

employees shall take no actions that would cause the government employee to violate, to appear to violate, or that would be otherwise inconsistent with, that standard of conduct.

**Protecting Information.** Every Company employee has an obligation actively to protect and safeguard the Company's confidential, sensitive and proprietary information, in a manner designed to prevent the unauthorized disclosure of such information.

**Information about Other Companies.** Employees must respect the nonpublic information of other companies, including our competitors. Although collecting information on our competitors from legitimate sources to evaluate the relative merit of their products, services and marketing methods is proper and often necessary, any form of questionable intelligence gathering is strictly against the Code.

**Violations of the Code include asking other employees to violate the Code, not reporting a Code violation or failing to cooperate in a Code investigation. Any retaliation against an individual who reports a violation of this Code or of law in good faith, or who assists in the investigation of a reported violation, is itself a serious violation of the Code and applicable law.**

**You are expected to adhere to the Code. Violating the Code may result in disciplinary action, up to and including termination of your relationship with Neustar.**

## Your Responsibilities

- These principles are not the entire Code of Business Conduct – they are the principles underlying the Code. It is your responsibility to read and understand the Code of Business Conduct which follows and is available for viewing on the Neustar Home Page at [www.Neustar.biz](http://www.Neustar.biz).
- You must comply with the Code in both letter and spirit. Ignorance of the Code will not excuse you from its requirements.
- Follow the law wherever you are and in all circumstances.
- Never engage in behavior that harms the reputation of the Company. If you wouldn't want to tell your parents or your children about your action - or wouldn't want to read about it in a newspaper – don't do it.
- Some situations may seem ambiguous. Exercise caution when you hear yourself or someone else say, "Everybody does it," "Maybe just this once," "No one will ever know" or "It won't matter in the end." These are signs to stop, think through the situation and seek guidance. Most importantly, don't ignore your instincts. Ultimately, you are responsible for your actions.
- You have several options for seeking guidance. You may discuss concerns with your manager, other members of management, or the responsible employees in the Human Resources or Legal Department. Directors and executive officers should contact the Legal Department or the Chair of the Audit Committee.

Employees are obligated to report violations, and suspected violations, of the Code. This includes situations where a manager or colleague asks you to violate the Code. In all cases, there will be no reprisals for making a report in good faith, and every effort will be made to maintain confidentiality.

- The reporting of a violation of the Code in bad faith, a frivolous report of a violation of the Code, or a fabricated report of a violation of the Code will be considered a violation of the Code.

You can report violations and suspected violations of the Code:

- to your manager or higher levels of management, the Senior Vice President of Human Resources, or the Company's General Counsel; or
- through the Company's Compliance Hotline or Web Form.

If you wish to make a report anonymously, you may do so by using the Compliance Hotline or Web Form.

If an accounting or auditing matter is involved, concerns or reports of violations may also be submitted by email to the Audit Committee.

Members of the Board should report potential violations to the General Counsel or the Audit Committee chair.

***Contact information for reporting potential violations through the mechanisms described above can be found on the page at the end of the Code titled “Contact Information for Reporting Violations.”***

- Employees are obliged to cooperate with investigations under the Code. Employees must understand the Code, seek guidance when necessary and report suspected Code violations. If a manager knows that an employee is contemplating a prohibited action and does nothing, the manager may be held responsible along with the employee.
- If you have questions about any situation or if there is any uncertainty about how an action may be interpreted, ask. Always ask.

This Code should help guide your conduct. But the Code cannot address every circumstance and isn't meant to; this is not a catalogue of workplace rules. You should be aware that the Company has policies in such areas as securities trading and workplace conduct. Employees should consult the policies of Neustar in specific areas as they apply.

- The most important message is this: When you are uncertain about any situation, ask for guidance.

**The Code of Business Conduct is not an express or implied contract of employment and does not create any contractual rights of any kind between Neustar and its employees. The Code does not modify the employment relationship between an employee and the Company, whether at-will or governed by contract. In addition to the Code, there are other standards governing the conduct of Neustar employees with which each Neustar employee is required to comply.**

**Neustar reserves the right to amend, alter or terminate the Code at any time for any reason.**

## Compliance with Laws

Employees must follow the law wherever they are around the world.

A fundamental principle of Neustar is that its employees will comply with all applicable law wherever they are around the world.

## Honesty and Integrity

Employees must accurately and honestly represent the Company and will not engage in any activity or scheme intended to defraud anyone. Employees will act with candor and honesty in their communications with our stockholders and potential investors, and our attorneys and auditors.



# Conflicts of Interest

All employees owe a duty of undivided and unqualified loyalty to Neustar. Employees should avoid actual and perceived conflicts of interest and should avoid any activity that is or has the appearance of being hostile or adverse to, or competitive with, Neustar or that interferes with the proper performance of their duties, responsibilities or loyalty to Neustar.

## Overview

Your personal activities and relationships must not conflict, or appear to conflict, with the interests of the Company. Keep in mind, the Code can't specifically address every potential conflict, so use your conscience and common sense. When confronted with any situation that may be perceived as a conflict of interest, even if you don't believe the situation would violate this Code, or when unsure about proper conduct, you should seek guidance from your principal manager, any member of management or responsible employees in the Human Resources or the Legal Department. When questions arise, seek guidance.

## General Principles

- Avoid situations where your personal interests conflict, or appear to conflict, with those of the Company.
- Any actual or potential conflict of interest must be reported to the General Counsel. Employees who are unsure whether they are involved in a conflict of interest or whether an action might create a conflict of interest should seek guidance, as discussed above. A conflict of interest or potential conflict of interest may be resolved or avoided if it is appropriately disclosed and approved in accordance with the procedures below. In some instances, disclosure may not be sufficient and the Company may require that steps be taken to avoid a conflict of interest or that conduct be stopped.
- You may own up to 1% of the stock in a competitor, customer or supplier without seeking prior approval from the General Counsel and Chief Financial Officer so long as the stock is in a public company and you do not have discretionary authority in dealing with that company. If you want to purchase more than 1% of the stock in a customer, competitor or supplier, or if the company is nonpublic or you have discretionary authority in dealing with that company, then the stock may be purchased only with prior approval of the General Counsel and the Chief Financial Officer.
- If you have a financial or other interest in a transaction between the Company and a third party – even an indirect interest through, for example, a family member, close relative or a close friend, or if there is any other potential or actual conflict of interest – and you are in a position to influence that transaction, that interest must be disclosed to the General Counsel prior to the transaction when you become aware of it.

You may not take for yourself or disclose to others outside the Company any opportunity for financial gain that you find out about because of your position at Neustar or through the use of Company property or information.

You may not participate in a “Friends or Family” security offering of other companies if the offer was made to you because of your position at Neustar.

- You may not directly or indirectly conduct outside business that interferes with the proper performance of your job at Neustar, is conducted during normal working hours, utilizes Neustar confidential information or puts you in a situation where Neustar confidential information may be used intentionally or unintentionally.
- Any potential conflict of interest must be approved in advance by the General Counsel. Any potential conflict of interest that involves an officer of the Company or of a subsidiary must be approved in advance by the General Counsel and Chief Operating Officer (or if there is no Chief Operating Officer, the Chief Executive Officer). Any potential conflict of interest that involves a director or an

executive officer of the Company must be approved by the Board of Directors or its designated committee.

- Loans from the Company to directors and executive officers are prohibited. Loans from the Company to other officers and employees must be approved in advance by the Board of Directors or its designated committee.

# Financial Records

Financial and business records - both for internal activities and external transactions - must be prepared in a timely manner and must be accurate.

## Overview

Every company financial and business record—including time sheets, sales records and expense reports—must be accurate, prepared in a timely manner and in accordance with the law. These records are the basis for managing the Company's business and for fulfilling its obligations to stockholders, employees, customers, suppliers and regulatory authorities. Employees should not enter into side letters to contracts or similar arrangements without prior approval of the Chief Financial Officer and/or General Counsel. It is the responsibility of each employee to make sure that every business record which he or she deals with is accurate, complete and reliable.

If you know of violations by others, take note: You must report those instances, or you are in violation of the Code. Accurate records are everyone's responsibility. It's always a good idea to double-check them.

## General Principles

- Always record and classify transactions in the proper accounting period and in the appropriate account and department. Delaying or prepaying invoices to meet budget goals is a violation of the Code.
- All financial reports, accounting records, contracts, research reports, expense accounts, time sheets and other documents must accurately and clearly represent the relevant facts or the true nature of the transaction. Employees should not enter into side letters or other arrangements to contracts without prior approval of the Chief Financial Officer and/or General Counsel.
- Never falsify any document or distort the true nature of any transaction. All transactions must be supported by accurate documentation.
- All reports made to regulatory authorities, and other public communications, should contain disclosure that is full, fair, accurate, complete, timely and understandable.
- Employees must cooperate with investigations into the accuracy and timeliness of financial records. To the extent estimates and accruals are necessary in company reports and records, they must be supported by appropriate documentation and based on good faith judgment.
- Payments may only be made to the person or the firm that actually provided the goods or services.



# Use of Company Assets

Company assets – which include but are not limited to computers, software, materials and work time – must not be used for personal benefit.

## Overview

Company assets are meant for Company, not personal, use. Company assets include your time at work and work product, as well as the Company's equipment and vehicles, computers and software, Company information, and trademarks and name.

Common sense should prevail, of course. Incidental and immaterial personal use of Company assets such as computers and other equipment, telephones, and supplies, is permitted. Frequent or excessive use of such items, however, represents misuse. Theft or deliberate misuse of Company assets is a violation of the Code.

## General Principles

- You may not use the Company's assets for your personal benefit or the benefit of anyone other than the Company.
- Company computer systems and equipment are meant for Company use only. For example, they should never be used for outside businesses, illegal activities, gambling or pornography.
- Company information is an asset of the Company and must be used and protected appropriately.
- Misuse of Company assets may be considered theft and result in termination or criminal prosecution. You must have permission from your principal manager before you use any Company asset -- including information, work product or trademark--outside of your Company responsibilities.
- Before accepting payment for speeches or presentations related to the Company or your work at the Company, always get your principal manager's approval.

# Working with Customers and Suppliers

Customers and suppliers must be dealt with fairly with candor and honesty. Avoid excessive or lavish gifts that may give the appearance of undue influence and personal financial transactions with customers and suppliers that may or may appear to influence your ability to perform your job.

## Overview

It often is customary to exchange gifts and entertainment with customers and suppliers. The key is to keep an arm's length relationship. Also, you should know that special restrictions apply when dealing with government employees. For more information, see the next section on [Working with Governments](#). In all cases, when in doubt, seek guidance.

## General Principles

- The Code prohibits employees from accepting lavish or excessive gifts or entertainment. This is an area in which your judgment is critical. For instance, modest holiday gifts are usually fine. But an expensive weekend trip probably would not be. If you are uncertain, seek guidance from your principal manager.  
In some limited circumstances it may be customary or appropriate to entertain customers and accept entertainment from suppliers. It similarly may be customary and appropriate to arrange or take part in programs and events that include meals and lodging. For example: Business meal discussions with a customer or supplier are legitimate. Speaking at a continuing education program where the sponsor pays for the related travel and lodging is acceptable. It generally is not appropriate for an employee to accept a supplier's invitation to attend an entertainment or sporting event at the supplier's expense, although it may be appropriate if it demonstrably helps to build or maintain a business relationship. You must obtain permission from your principal manager before accepting such an invitation.
- Gifts and entertainment for customers, potential customers and suppliers must support the legitimate business interests of the Company and should be reasonable and appropriate under the circumstances. Always be sensitive to our customers' and suppliers' own rules on receiving gifts and entertainment.
- Company stock cannot be given as a gift on behalf of the Company under any circumstances.
- Consistent with the obligation we all have to act with integrity and honesty at all times, you should deal fairly with the Company's customers, suppliers, competitors and employees. No officer or employee should take unfair advantage of anyone through misrepresentation or any unfair business practice.  
Under no circumstances should you offer or accept any bribes or kickbacks. If any bribe or kickback is offered to you, you should immediately report the incident to the General Counsel.

# Working with Governments and Internationally

The public trust associated with transactions between the private sector and foreign or U.S. government entities imposes special responsibilities on Company employees and representatives to adhere to the same high standard of conduct expected of the government employee. Company employees shall take no actions that would otherwise cause the government employee to violate, to appear to violate, or that would be otherwise inconsistent with, that standard of conduct. Also, in transacting with foreign governments, persons, and organizations, the Company is mindful of the additional restrictions and responsibilities imposed by U.S. laws and regulations. Company employees must take all necessary precautions to comply with all applicable provisions.

## Overview

Conducting business with governments is not the same as conducting business with private U.S. parties. These transactions often are covered by special legal rules. No Company employee may offer or give anything of monetary value, including gifts, gratuities, favors, entertainment or loans, to an employee of a U.S. or foreign government agency, unless prior approval from the Legal and External Affairs Department has been obtained. In addition, neither the Company nor an individual acting on behalf of the Company may make political contributions, even where they are permitted by law. If you make a political contribution, it must be clear that you are acting as an individual and not as a representative of the Company. The Company will not reimburse you for any personal political contributions you make. You should consult with the Legal and External Affairs Department to be certain that you are aware of applicable rules. You must have the written approval of the Legal and External Affairs Department before providing anything that might be considered to be excessive value or non-routine to a government official or a candidate for public office. Under no circumstances can anything be given to a government official or candidate for office that (i) is intended to improperly influence any act or decision of such official, employee, or candidate for the purpose of promoting the business interests of Neustar in any respect, or (ii) would violate the governmental official's or political candidate's own professional ethical standards. Should you have any questions whatsoever about what is appropriate and what is not, you must consult with the Legal and External Affairs Department.

The Company prohibits the payment of bribes to U.S. and foreign government officials. Payments to foreign government officials are governed by the Foreign Corrupt Practices Act ("FCPA"). "Government officials" are employees of any government anywhere in the world, even low-ranking employees or employees of government-controlled entities. The term "government officials" also includes political parties and candidates for public office. It is your obligation to understand whether someone you deal with is a government official. If there are any questions concerning someone's status as a government official, consult the Legal and External Affairs Department.

In some countries it may be customary at times to pay government employees for performing their required duties. These, too, are governed by the FCPA. Facilitating payments, as they are known, are small sums paid to facilitate or expedite routine, non-discretionary government actions and may or may not be appropriate under the FCPA or laws of the foreign country. In contrast, a bribe, which is never permissible, is giving, promising or offering to give anything of value to a government official, his or her relatives, associates or other affiliated persons or organizations with the intention of influencing a discretionary decision of the government official. The prohibition extends not only to employees, officers and directors of the Company, but also to agents, subcontractors and other intermediaries, and should be reflected in any agreements with customers, vendors and agents.

Understanding the difference between a bribe and a facilitating payment is critically important. All facilitating payments must be approved in advance by the Chief Executive Officer, Chief Financial Officer and General Counsel, and recorded appropriately.



Further, the Company is committed to complying with all laws and regulations governing transactions involving non-U.S. governments, persons and organizations. The laws and regulations applicable to such dealings include, but are not limited to, the FCPA as noted above, the regulations administered by the Office of Foreign Asset Control ("OFAC") and the Bureau of Industry and Security ("BIS"), and U.S. antiboycott provisions. The United States has restrictions in place with respect to conducting business with certain countries, their governments and nationals, and certain individuals and organizations associated with embargoed countries or subject to trade restrictions for other reasons, as identified on lists maintained by the U.S. government. No one acting on behalf of the Company may be involved in business arrangements or otherwise engage in transactions with or involving sanctioned countries, nationals or entities in violation of U.S. laws and regulations. In addition, no one acting on behalf of the Company may engage, directly or indirectly, in transactions with "Specially Designated Nationals and Blocked Persons," or with those identified on the "Denied Persons List," the Entity List," or "Unverified List" in violation of U.S. laws and regulations. If you have questions about these or other restrictions, you must contact the Legal and External Affairs Department.

Our Company and its subsidiaries must comply with all applicable trade restrictions and boycotts imposed by the U.S. government. (A boycott is a restriction on a company's ability to ship goods into a specific country or do business there.) Moreover, our Company and its subsidiaries also must abide by U.S. anti-boycott laws that prohibit companies from participating in any international boycott not sanctioned by the U.S. government, and that impose certain reporting requirements concerning requests to comply with, further or support unsanctioned boycotts. This includes, for example, a request to provide information concerning our Company's dealings with boycotted countries. Any such requests and any questions generally concerning boycotts and antiboycott obligations should be reported to the Legal Department.

## General Principles

- The ban on bribes applies to all governments, foreign and domestic, and extends to third parties acting on behalf of the Company, including all contractors and consultants. Employees must not engage a vendor, contractor or consultant if the employee has reason to believe that the contractor or consultant may attempt to bribe a government official.
- Employees must comply with all U.S. trade laws and regulations including, but not limited to, the FCPA, OFAC and BIS regulations, and U.S. antiboycott requirements. Any questions or concerns regarding the permissibility of a certain transaction or other dealing are to be brought to the Legal Department.
- The Company may hire government officials or employees to perform services that have a legitimate business purpose, but only pursuant to a written agreement and with the prior approval of the Legal and External Affairs Department. Government officials should never be hired to perform services that conflict with their official duties.
- All facilitating payments must be documented in written agreements with the receiving government official, and approved in advance by the Chief Executive Officer, Chief Financial Officer and General Counsel, and recorded as required by applicable laws and regulations.
- The Company does not make any political contributions, even where they are permitted by law. If you make a political contribution, it must be clear that you are acting as an individual and not as a representative of the Company.
- Employees will not be reimbursed for political contributions. Your job will not be affected by your choices in personal political contributions.
- Employees must comply with all U.S. boycott and anti-boycott requirements.

# Protecting Information

Every Company employee has an obligation actively to protect and safeguard the Company's confidential, sensitive and proprietary information in a manner designed to prevent the unauthorized disclosure of such information.

## Overview

It is your obligation to safeguard the Company's nonpublic information. Some Neustar information may not be appropriate for sharing within the Company. Before disclosing nonpublic information to others within the Company, be sure that it is appropriate for them to have access to the information. In addition, you should not share the Company's nonpublic information with anyone outside the Company unless it is necessary as part of your work responsibilities and appropriate safeguards are in place. This obligation is in addition to any confidentiality or nondisclosure agreements you may have executed.

Nonpublic information is any information that has not been disclosed or made available to the general public. Trading in stocks or securities based on nonpublic information, or providing nonpublic information to others so that they may trade or make further disclosures, is illegal and may result in prosecution.

Nonpublic information includes items such as financial or technical data, financial plans and projections, customer lists, plans for acquisitions or divestitures, new products, software code, software development plans, inventions or marketing campaigns, personal information about employees, major contracts, expansion plans, financing transactions, major management changes and other corporate developments. If in doubt, consider the information nonpublic.

In any circumstances in which any Neustar representative is considering disclosing potentially material, nonpublic information, the representative must check with Neustar's Legal Department before such information is disclosed to determine whether the information has already been publicly disclosed and whether the information is material. In any circumstances in which potentially material information has been improperly disclosed, the General Counsel must be notified immediately.

There are specific policies in place for disclosure of information with the media and financial communities. No employee should speak with anyone in the media or financial community without complying with these policies.

## General Principles

- Do not disclose nonpublic information to anyone outside the Company, except when disclosure is required for business purposes and appropriate steps have been taken to prevent misuse of the information.
- Employees may not buy or sell stocks or securities of Neustar or of other entities based on nonpublic information obtained from their work at the Company. There are specific policies that address securities trading in more detail and you must comply with these policies.
- Disclosing nonpublic information to others, including family and friends, is a violation of the Code and may violate the law.
- Consult with the General Counsel regarding retention of records in the case of actual or threatened litigation or governmental investigation.



# Information about Other Companies

Employees must respect the nonpublic information of other companies, including our competitors. Although collecting information on our competitors from legitimate sources to evaluate the relative merit of their products, services and marketing methods is proper and often necessary, any form of questionable intelligence gathering is strictly against the Code.

## Overview

The Company may receive information about other companies in a number of ways. Information obtained under a confidentiality agreement must be protected in the same manner as the Company protects its own confidential information and may only be used in accordance with the terms of the confidentiality agreement. Information that is publicly available or that is obtained from legitimate sources may be used to evaluate the relative merit of competitor's products, services and marketing methods.

Some methods of acquiring information are not proper. For example, Company employees should not seek confidential information from a new employee who recently left a competitor if doing so would induce that employee to violate any contractual obligations he or she may have to a former employer. Company employees should not misrepresent their identity in the hopes of getting confidential information about a competitor. Any form of questionable intelligence gathering is strictly against the Code.

Any trading of securities based upon nonpublic information in the Company's possession, whether it relates to the Company, its customers, suppliers, competitors or other third parties, is prohibited by this Code and is illegal. There are specific policies that address securities trading in more detail and you must comply with these policies.

# Administration of the Code

All Company employees, directors, officers and contractors will receive or have access to a copy of this Code at the time they join the Company.

The Company expects each employee, director, officer and contractor to conduct the business and affairs of the Company in a manner consistent with the Code of Business Conduct. Failure to abide by the Code of Business Conduct or the guidelines for behavior that the Code of Business Conduct represents may lead to disciplinary action. For alleged violations of the Code of Business Conduct, the Company will weigh relevant facts and circumstances. Discipline will vary depending on the circumstances and may include, alone or in combination, a letter of reprimand, demotion, loss or reduction of bonus, suspension or even termination of service.

While the Company will generally attempt to communicate changes in the Code of Business Conduct concurrent with or prior to the implementation of such changes, the Company reserves the right to modify, amend or alter the Code of Business Conduct without notice to any person or employee. Failure to receive notification of any modification, amendment or alteration of the Code of Business Conduct will not excuse any failure to comply with the Code as so modified, amended or altered.

Any questions regarding interpretation of the Code should be directed to the General Counsel, Senior Vice President of Human Resources or the Chief Financial Officer. The provisions regarding administration of the Code may be varied as necessary in particular cases and as may be required to conform to local law or contract.

## Approvals and Waivers

Any prior approvals required pursuant to the Code shall be obtained in writing from the appropriate person. A copy of the approval shall be provided to the General Counsel and the Senior Vice President of Human Resources and retained as required under the Company's document retention policies.

Any waiver of a provision of this Code for a director or an executive officer of the Company must be approved by the Board of Directors or its designated committee, recorded in writing, and disclosed to the extent required by law or regulation. Any waiver of a provision of this Code for individuals other than directors and executive officers must be approved in writing by the General Counsel and Chief Financial Officer. Copies of all waivers will be provided to the General Counsel. All waivers and approvals will be kept in the Legal Department and retained as required under the Company's document retention policies. Copies of all waivers and approvals will also be kept in the respective employee file, as appropriate.

# Reporting and Investigation of Concerns Regarding Compliance with the Code

The Company expects that all employees will take all responsible steps to prevent a Code violation.

All employees are obligated to report violations and suspected violations of the Code of Business Conduct and any concerns they may have pertaining to non-compliance with the Code. You can report violations and suspected violations of the Code:

- to your manager or higher levels of management, the Senior Vice President of Human Resources, or the Company's General Counsel; or
- through the Company's Compliance Hotline or Web Form.

If you wish to make a report anonymously, you may do so by using the Compliance Hotline or Web Form. You should not use the Compliance Hotline or Web Form for personal grievances not involving this Code or violations of law. We would prefer that you identify yourself to facilitate our investigation of any report. However, you may choose to remain anonymous.

If an accounting or auditing matter is involved, concerns or reports of violations may also be submitted by email to the Audit Committee.

Members of the Board and executive officers should report potential violations to the General Counsel or the Audit Committee chair.

***Contact information for reporting possible violations through the mechanisms described above can be found on the page at the end of the Code titled "Contact Information for Reporting Violations."***

Any manager who receives a report of a potential violation of this Code must report it immediately to the General Counsel or Senior Vice President of Human Resources. Because failure to report wrongdoing can itself be understood to condone the wrongdoing, we emphasize the importance of reporting. Failure to report knowledge of wrongdoing may result in disciplinary action against those who fail to report.

We will hold complaints in confidence to the extent legally permissible. In accordance with applicable law, it is the policy of Neustar not to allow retaliation for reports of misconduct or reports of violations of this Code made in good faith. Retaliation in any form against an individual who reports a violation of this Code or of law in good faith, even if the report is mistaken, or who assists in the investigation of a reported violation, is itself a serious violation of this policy. Acts of retaliation should be reported immediately. Any employee who engages in retaliation is subject to discipline, up to and including termination, and in appropriate cases, civil and/or criminal liability.

All employee communications made in good faith will be treated promptly and professionally and without risk of retribution whatsoever. Any use of these reporting procedures in bad faith or in a false or frivolous manner will be considered a violation of this Code.

We will use reasonable efforts to protect the identity of the person about or against whom an allegation is brought, unless and until it is determined that a violation has occurred.

All reports will be taken seriously and investigated promptly. Ongoing investigations will not be discussed in a public forum. Any person involved in any investigation in any capacity of a possible misconduct must not discuss or disclose any information to anyone outside of the investigation unless required by law or when seeking his or her own legal advice, and is obligated to cooperate fully in any investigation.

Corrective and disciplinary action will be taken as necessary. Violations of the law will be reported through the Legal Department to the proper authorities.



## Investigations

All reports of suspected Code violations will be forwarded to the General Counsel and Senior Vice President of Human Resources, except for complaints and concerns involving accounting or auditing matters, which will be handled in accordance with procedures established by the Audit Committee.

The responsibility for administering the Code and investigating violations of the Code rests with the Senior Vice President Human Resources and the General Counsel. If the alleged violation involves a director or executive officer, the Audit Committee shall have responsibility for investigation of the complaint. They will make a preliminary determination that will be communicated to the principal manager of the alleged violator. The General Counsel and Senior Vice President Human Resources, in conjunction with the Chief Financial Officer and other members of executive management, as appropriate, shall have sole authority for making the final determination whether a violation has occurred. If the alleged violation involves a director or executive officer, however, the Audit Committee shall have sole authority for making the final determination whether a violation has occurred. The subject of the investigation will be afforded an opportunity to respond to any allegations made against him or her if preliminary results of the investigation require a statement from the subject.

A person suspected of violating the Code may be suspended with or without pay while an investigation is conducted. The suspension will be at the discretion of the Senior Vice President of Human Resources and General Counsel, who may consider the recommendations of the employee's principal manager.

The Chief Financial Officer and the General Counsel will periodically report significant compliance issues to the Audit Committee of the Board of Directors, including significant reported Code violations, the status of such violations and, if applicable, the corrective actions taken.

## Disciplinary Actions

Violations may result in disciplinary action. The Company will strive to impose discipline for each Code violation that fits the nature and particular facts of the violation. The Company generally will issue warnings or letters of reprimand for less significant, first-time offenses. Violations of a more serious nature may result in suspension without pay, demotion, loss or reduction of bonus, or any combination. Termination of service with the Company generally is reserved for conduct such as theft or other violations amounting to a breach of trust, or for cases where a person has engaged in multiple violations. Termination may also be appropriate for ethical violations if an individual has consciously chosen to pursue unethical behavior.

The authority to determine corrective and disciplinary action rests with the General Counsel and the Senior Vice President of Human Resources, in conjunction with the Chief Operating Officer (or if there is no Chief Operating Officer, the Chief Executive Officer) and other members of executive management, as appropriate, who may consider recommendations of the employee's principal manager.

The appropriate principal manager or a representative from Human Resources will communicate the final discipline decision.

A violator may seek reconsideration of the final discipline decision by submitting a written request for reconsideration within fourteen days of notification of the disciplinary action. The request for reconsideration will be considered by the General Counsel and Senior Vice President of Human Resources, in conjunction with the Chief Financial Officer and Chief Operating Officer (or if there is no Chief Operating Officer, the Chief Executive Officer), as may be suggested by the nature of the offense and mitigating circumstances.

A notation as to the final decision as well as any determinations of no violation, letters of reprimand or other written communications with the alleged violator will be placed in the employee's personnel file as part of his or her permanent record.

Violations of this Code are not the only basis for disciplinary action. The Company has additional policies, guidelines and procedures governing conduct, and violations of those policies, guidelines and procedures may also result in corrective or disciplinary action.

## Signature and Acknowledgement

All new employees must sign an acknowledgment form confirming that they have read the Code and understand its provisions. Failure to read the Code or to sign an acknowledgment form, however, does not excuse an employee from the terms of this Code.

## It's Up to You

Administration of the Code is everyone's responsibility. There are colleagues to help you do the right thing. If you act with integrity and seek guidance when you are uncertain, you'll be doing the right thing.

# Questions and Answers about Procedures

The following questions and answers relate to procedures relevant to potential violations of the Code of Business Conduct.

It is our intent that these questions and answers be followed in most cases where a potential violation of the Code has occurred.

## Reporting

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**Q. To whom should an employee report suspected violations of the Code?**

A. You can report suspected violations of the Code: (a) to your manager or higher levels of management, the Senior Vice President of Human Resources, or the General Counsel; or (b) through the Company's Compliance Hotline or Web Form. If an accounting or auditing matter is involved, concerns or reports of violations may also be submitted by email to the Audit Committee. **Contact information for reporting possible violations through these mechanisms can be found on the page at the end of the Code titled "Contact Information for Reporting Violations."**

**Q. Will there be any retaliation for reporting in good faith a violation of the Code?**

A. Absolutely not. Good faith reports of violations of the Code may be made without fear of reprisal or retaliation.

**Q. Can an employee report a suspected violation of the Code confidentially?**

A. Every effort will be made to maintain in confidence the identity of a person making a report of a suspected Code violation. Provision has been made for anonymous reporting of alleged violations.

## Investigation

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**Q. Who should take the lead in investigating suspected Code violations?**

A. The investigation normally will be conducted by the Senior Vice President of Human Resources and the General Counsel.

**Q. Will the subject of the investigation receive notification of the investigation?**

A. It depends on the circumstances and the results of the preliminary investigation. If there is insufficient evidence of a Code violation, the investigation may be closed without notification. In the event it is determined that evidence of a violation exists, the individual will be notified but that notification may not occur until after records have been reviewed and witnesses interviewed.

**Q. Will the subject of the investigation have an opportunity to respond to any allegations made against him or her?**

A. Maybe. The subject of an investigation will have the opportunity to respond to any allegations made against that person if the preliminary results of the investigation require a statement from the subject. The General Counsel or Senior Vice President Human Resources will determine whether such a statement is necessary.

**Q. Can a suspected violator be suspended while an investigation is ongoing?**

A. Yes, at the discretion of the Senior Vice President of Human Resources and General Counsel, a person suspected of violating the Code can be suspended with or without pay while an investigation is conducted.



## Decision

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**Q. Who makes the decision on whether a violation of the Code has occurred?**

- A. A preliminary determination will be made by the Senior Vice President of Human Resources and the General Counsel (or by the Audit Committee if the investigation involves a director or executive officer). That preliminary determination will be communicated to the principal manager of the alleged violator. Sole authority for making a final determination that a violation has occurred rests jointly with the Senior Vice President of Human Resources and General Counsel, in consultation with the Chief Financial Officer and others as appropriate.

## Discipline

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**Q. Does anyone make a recommendation on appropriate discipline?**

- A. Yes, the principal manager may make a recommendation on appropriate discipline. That recommendation should be given to the General Counsel and the Senior Vice President of Human Resources, who will determine the final disciplinary action, if any.

**Q. What factors will be considered in determining the appropriate punishment?**

- A. The Company strives to impose discipline for a code violation that fits the nature and particular facts of a violation, including the history of those involved.

**Q. What forms of discipline does the Company impose?**

- A. The Company generally will issue warnings or letters of reprimand for less significant, first-time offenses. Violations of a more serious nature may result in suspension without pay, demotion, loss or reduction of bonus or any combination. Termination of employment generally is reserved for theft or other violations amounting to a breach of trust, and for cases where a person has engaged in multiple violations. Termination may also be appropriate for ethical violations if the employee has consciously chosen to pursue unethical behavior.

**Q. Can the violator seek reconsideration of the final discipline decision?**

- A. Yes, within 14 days of notification of the final discipline decision, the alleged violator can make a written request for reconsideration, which will be considered by the General Counsel and the Senior Vice President of Human Resources, in conjunction with the Chief Financial Officer and Chief Operating Officer (or if there is no Chief Operating Officer, the Chief Executive Officer).

**Q. Who communicates the final discipline decision?**

- A. The appropriate principal manager or representatives from the Human Resources department.

## Reporting and Record Keeping

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**Q. Do the Senior Vice President of Human Resources, Chief Financial Officer and General Counsel report the violation and discipline to anyone other than the violators?**

- A. Yes, the Senior Vice President of Human Resources, Chief Financial Officer, as appropriate, and General Counsel will report their final decision to the violator's principal manager and to the Audit Committee of the Board of Directors.

**Q. What documents concerning the violation will be maintained in an employee's personnel records?**

- A. A notation as to the final decision as well as any letters of reprimand or other communications with the violator, including statements finding that there was no violation, will be placed in the employee's personnel file as part of his or her permanent record.

*The Code of Business Conduct is not an express or implied contract of employment and does not create any contractual rights of any kind between Neustar and its employees. The Code does not modify the employment relationship between an employee and the Company, whether at-will or governed by contract. In addition to the Code, there are other standards governing the conduct of Neustar employees with which each Neustar employee is required to comply.*

*Neustar reserves the right to amend, alter or terminate the Code at any time for any reason.*

## Contact Information for Reporting Violations

Employees should report suspected Code violations: (a) to their manager or higher levels of management, the Senior Vice President of Human Resources, or the General Counsel; or (b) through the Company's Compliance Hotline or Web Form. If an accounting or auditing matter is involved, concerns or reports of violations may also be submitted by email to the Audit Committee.

### **Senior Vice President of Human Resources**

Christine Brennan  
21575 Ridgetop Circle  
Sterling, VA 20166  
Phone: (571) 434-5357

### **General Counsel**

Scott Blake Harris  
21575 Ridgetop Circle  
Sterling, VA 20166  
Phone: (202) 533-2920

### **Compliance Hotline and Web Form**

The number for the Company's Compliance Hotline and the Web Form are located on the Company's Investor Relations website at [www.Neustar.biz](http://www.Neustar.biz).

### **Accounting or Auditing Matters**

Concerns or reports of potential violations related to accounting or auditing matters may be sent by email to the Audit Committee at [CorporateCode@Neustar.biz](mailto:CorporateCode@Neustar.biz).

Please find below:

- Survey Results for the past five years and
- Sample NPAC Performance Feedback Survey from 2012

For more detail on our Customer Satisfaction and Customer Service, Please See Proposal Section 2.5 which is attached to the IASTA tool in response to RFP Section 15.1 Option Attachments.

### NPAC Survey Results for the Past Five Years

Year	Actual Score	Best Score	Industry Standard
2008	3.46	4.0	Exceptional
2009	3.66	4.0	Superior
2010	3.68	4.0	Superior
2011	3.80	4.0	Superior
2012	3.90	4.0	Superior

#### Score Key:

Equal or greater than 2.00 but less than 3.00 = Average  
Equal or greater than 3.00 but less than 3.25 = Above Average  
Equal or greater than 3.25 but less than 3.5 = Exceptional  
Equal or greater than 3.5 but less than 4.0 = Superior



Welcome to the Number Portability Administration Center (NPAC) Users Survey. Neustar would like to obtain your feedback and comments concerning your interaction with the NPAC. Your response will be forwarded to Neustar's Business Operations group for evaluation and will assist us in better meeting your future needs.

Note: This survey deals only with Neustar's provision of NPAC services and not with any other services or products offered by Neustar. This survey resides on a secure third-party server hosted by TMNG, the firm hired to administer this process. Your individual responses will be held confidential and will not be shared with anyone outside of Neustar and TMNG. Please note: including comments with your ratings will be most beneficial in addressing any potential future service changes/enhancements.

The survey will keep track of your company's answers for each section, and these answers may be accessed and changed at any time up until the survey deadline of October 26, 2012.

Thank you for participating.

Your responses are appreciated.

4	3	2	1
<b>Extremely Satisfied</b>	<b>Somewhat Satisfied</b>	<b>Somewhat Dissatisfied</b>	<b>Extremely Dissatisfied</b>

## 1. Customer Service

### 1a. Responsiveness

	4	3	2	1
Help Desk—Tier 1 support				
Analysts—Tier 2 support				
Customer Connectivity Services				
Billing Personnel				
Account Management				
Senior Management				
Neustar overall				

**Comments:**

### 1b. Accessibility

	4	3	2	1
Help Desk—Tier 1 support				
Analysts—Tier 2 support				
Customer Connectivity Services				
Billing Personnel				
Account Management				
Senior Management				
Neustar overall				

**Comments:**

### 1c. Knowledge

	4	3	2	1
Help Desk—Tier 1 support				
Analysts—Tier 2 support				
Customer Connectivity Services				
Billing Personnel				
Account Management				
Senior Management				
Neustar overall				

**Comments:**

**1d. Issues handled with a sense of urgency**

	4	3	2	1
Help Desk—Tier 1 support				
Analysts—Tier 2 support				
Customer Connectivity Services				
Billing Personnel				
Account Management				
Senior Management				
Neustar overall				

**Comments:****1e. Neustar personnel act as customer advocates**

	4	3	2	1
Help Desk—Tier 1 support				
Analysts—Tier 2 support				
Customer Connectivity Services				
Billing Personnel				
Account Management				
Senior Management				
Neustar overall				

**Comments:**

## 2. Billing

	4	3	2	1
Accuracy				
Timely delivery				
Sufficient detail				
Ease of reading invoice				
Type of payment options				

**Comments:**

## 3. Industry forums (e.g. LNPAWG, Cross Regional, Testing)

	4	3	2	1
Knowledge level displayed				
Neutrality				
Responsiveness				
Documentation				
Use of resources				

**Comments:**



**4. New Service Rollout****4a. On-time delivery of:**

	4	3	2	1
SOW				
Product				
Level of Detail Description				
Schedule				
Pricing				

**Comments:****4b. Testing**

	4	3	2	1
Test Engineer Knowledge				
Test Engineer Responsiveness				
Test Engineer Communication Skills				
Applications Support Responsiveness to Issues				
Test Environment Availability for Scheduled Turn-up, Group and Failover Testing				
Test Engineer successfully managed testing time:				
o Turn-up testing				
o Group and Failover testing				

**Comments:**

## 5. Operations

### 5a. Outages

	4	3	2	1
Responsiveness of Help Desk, Service Delivery, Operations and Management				
Knowledge level of Help Desk, Service Delivery, Operations and Management				
Sense of urgency displayed by Help Desk, Service Delivery, Operations and Management				
Root Cause Analysis Reporting				
Accuracy of Resolution				

**Comments:**

### 5b. System Performance

	4	3	2	1
System Availability				
System Reliability				
System Responsiveness				
System Accessibility				
System Throughput				

**Comments:**

**5c. Industry Communications**

	4	3	2	1
Frequency				
Usefulness				
Timeliness				
Website content				
Website ease of use				

**Comments:****6. NPAC Pool Block Provisioning and Mass Porting**

	4	3	2	1
Accessibility of NPAC Pooling and Mass Porting personnel				
Responsiveness of NPAC Pooling and Mass Porting personnel				
Knowledge level of NPAC Pooling and Mass Porting personnel				
Order fulfillment - Timeliness				
Order fulfillment - Accuracy				
Ticket Support				
Issues handled with a sense of urgency				

**Comments:**

## 7. Neustar's Image as a vendor:

For the section that follows, please use the following definition as you provide your response:

- **Reliable**—Our clearinghouse services depend on complex technology that is designed to deliver reliability up to 99.9%. We commit to our customers to deliver high quality services across numerous measured and audited service levels, including system availability and response times.
- **Responsive**—We learn from the operational experiences of our customers and we routinely apply that knowledge to further enhance the clearinghouse. Our customers benefit from the compounded effect of shared industry insights.
- **Trusted**—The data we collect are important and proprietary. Accordingly, we have developed procedures and systems to protect the privacy and security of customer data, restrict access to the systems and safeguard the integrity of our clearinghouse.
- **Neutral**—In managing our clearinghouse services, we adhere to FCC-defined neutrality regulations and policies. Independent third parties audit our adherence to these requirements on a quarterly basis. In fact, the FCC has designated Neustar as a neutral company.

	4	3	2	1
Neustar As Neutral Third-Party Service Provider				
Level of Trust your company has in Neustar				
Value Neustar brings to your company				
Neustar's Demonstrated Industry Thought Leadership				
Neustar's emphasis on technological innovation				
Neustar as a reliable partner				

Comments:

## 8. Overall customer focus

	4	3	2	1
Overall customer focus				

Comments:



## 1.2 NPAC/SMS Overview

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### Why Neustar

- Over 15 years of experience architecting, developing, maintaining, and improving the NPAC/SMS to provide the highest quality of service to the Industry
- Five-Layer custom-built NPAC/SMS architecture with focused expertise at each Layer, as well as a cross-functional approach to deliver the highest levels of availability, scalability, reliability, and performance

## Security-Related Information

- Highly redundant architecture for all Layers designed to increase availability of the NPAC/SMS

## Security-Related Information

- Separate Database for reporting to ensure the live NPAC/SMS is not impacted by offline queries and reports
- Preserve and maintain the integrity of over 1000 business rules in a constantly changing environment

### New for the Next Term

- All required enhancements listed in RFP Section 7.1
- Sufficient flexibility to include all future considerations listed in RFP Section 7.2
- Further automation to guarantee 99.99% high-availability NPAC/SMS architecture
- New NPAC Portal to deliver a seamless and fully functional user experience across all NPAC services
- Additional connectivity options including Ethernet for greater choice

TMNG finds the overall NPAC operating environment to be consistently stable, robust, scalable/expandable, and well managed...

TMNG—2012 Article 14 audit

The NPAC/SMS platform operates on a custom-built 5-Layer service architecture, uniquely tailored to meet and exceed the U.S. Industry's functional specifications, interface requirements, and service level requirements. As a critical element of every Service Provider's network and subscriber operations, the NPAC/SMS must perform to the highest levels of availability, must be able to support high and varying levels of demand, must be scalable over time, and must be flexible and modular enough to accommodate new requirements without disruption.

Proposal Section 1.2, NPAC/SMS Overview, describes the elements of the NPAC/SMS's technical design, and the manner in which Neustar's uniquely designed operation provides the Industry with the highest levels of functionality, reliability, and performance. Exhibit 1.2-1 demonstrates our performance in 2012. Neustar's commitment to pristine operations and design pre-dates the current RFP; exceeding SLRs and customer expectations has been ingrained in our culture over the last 15 years, and has resulted in several aspects of the NPAC/SMS that go well above and beyond Industry requirements. For example, Neustar has developed customized NPAC/SMS monitoring tools to evaluate the health and performance of the 5-Layer architecture, and pro-actively identify any issues before they become visible to service providers. Security-Related Information

This function is not required under the FRS and was developed proactively by Neustar. Security-Related Information

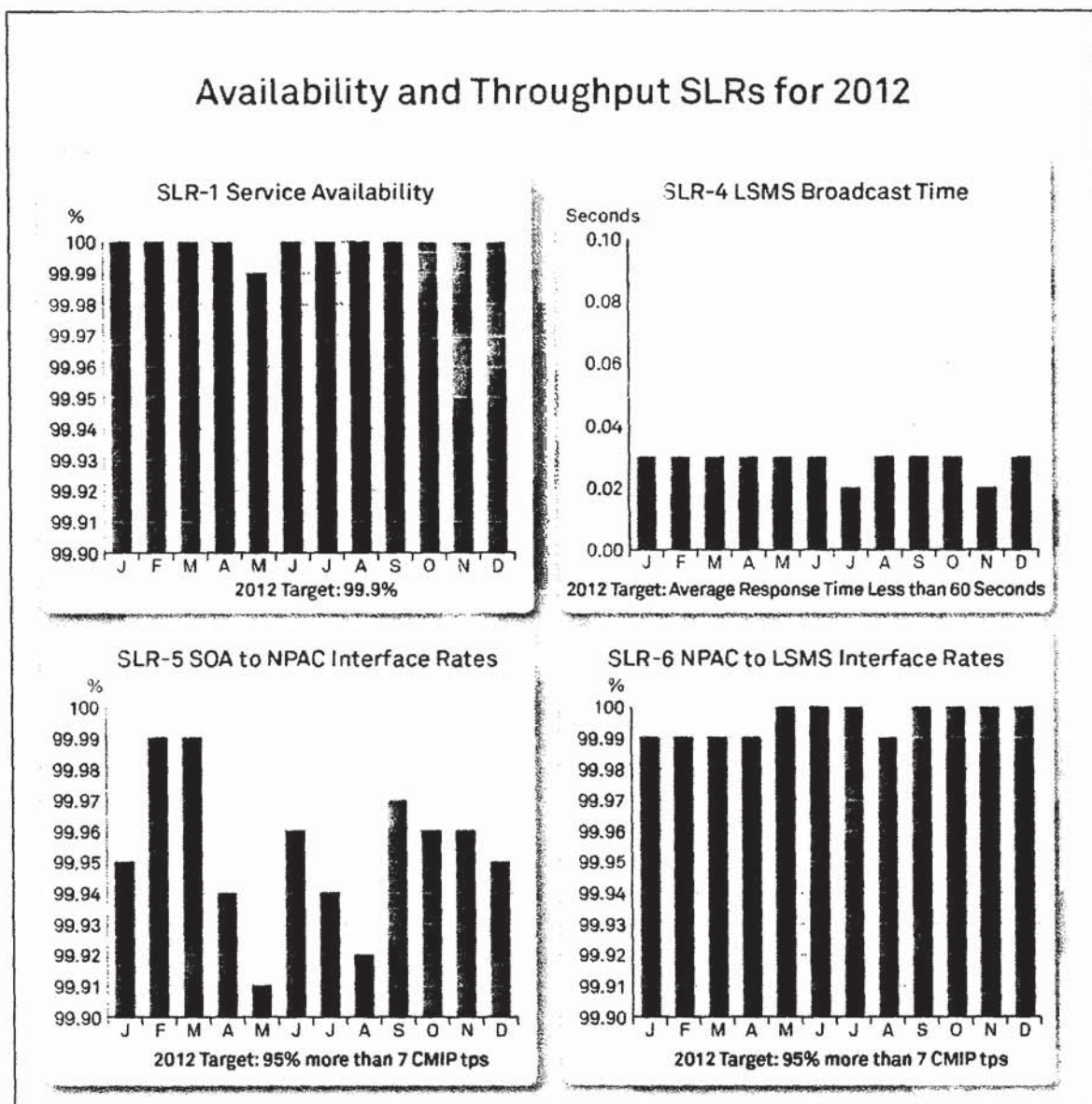
These are just a few of the Neustar custom-built tools and procedures that are essential to the NPAC's operation, and which a new vendor would have to pick up on the job.

Neustar has successfully met or exceeded the requirements for 11,333 out of 11,340 NPAC/SMS service level measurements over the last five years. In addition, our data center, network, and storage systems are consistently rated as exceeding Industry best practices by independent third parties. Neustar's proposal for the next term includes building upon this performance—plus continued investment into the NPAC/SMS architecture, regular technology refreshes, and process refinements to continue raising the bar.

## Proven Design and Development Principles

One way to deliver an NPAC/SMS would be to outsource the deployment or operation of the platform to a third party, with the prime LNPA focused primarily on system design, implementation, and interaction with Service Providers. A vendor taking this approach would be conceding that its strengths do not lie in high performing data center operations, signifying a need to separate the key functions of the LNPA amongst multiple suppliers. Given the unique nature of the LNPA service, however—specifically the wide variety of constituents for whom responsiveness and technical knowledge is essential—the coordination and collaboration between the product team that works with the Industry to design and develop the solutions, the engineering staff that implements the solutions, and the operations staff that maintains it, is a vital ingredient for success. Any miscommunication in this chain can result in delivery of a solution that does not meet the needs of the Industry and could delay fulfillment of any number of requirements. Any changes in the delivered solution as a result of hand-offs between the LNPA and its vendors will generate further chaos and finger-pointing, potentially resulting in further delays and impacts to Service Providers.





**Exhibit 1.2-1:** Neustar's unique operations provide the Industry with the highest level of service.

When operations are outsourced, there are always disconnects between the entity that engineered the solution and the entity operating it, increasing the likelihood for bugs and service degradations.

The concentration of design, engineering, and operations within a single entity is the best way to ensure high levels of performance—Neustar's experience proves this. Neustar utilizes a prevailing DevOps software development methodology (also called "agile operations") that stresses communication, collaboration and integration between Development, QA and Operations. It has been shown to be more responsive to requested changes and

enhancements and better able to deliver superior services, reliability, and availability. DevOps targets software delivery, quality testing, feature development and maintenance releases in order to improve reliability and security as well as create faster, more reliable development and deployment cycles. As business and development teams need more agility, a fundamental reorientation is needed to provide systems infrastructure in an effective manner. DevOps has been successfully implemented within the NPAC technology teams and has proven to be a valuable model with significant benefits to customers.

If another Respondent plans to rely on Neustar's application software to build an NPAC/SMS solution, it will not be able to simply recompile the code in a new data center and meet the Industry's needs—the RFP has increased performance requirements in several arenas, many of which will require updates to the existing NPAC/SMS software. Not only would the Respondent have to modify application software that was developed by Neustar and is unfamiliar to their engineers, it also would have to integrate that application software into a fully-functional service operation—including data centers, routers, switches, firewalls, security systems, databases, storage systems, and countless other elements of the total solution. Finally that Respondent would need to re-create the operational processes and procedures that enable Neustar to operate at such a high level of service quality today.

#### Security-Related Information

### New for the Next Term

During our tenure as the LNPA we have, in partnership with the Industry, evaluated 452 NANC and over 100 Illinois change orders, and deployed 380 change orders over 11 major software releases and countless point releases. Neustar has proven its ability to seamlessly enhance the NPAC/SMS platform with new service provider requirements without disruption or loss of backward compatibility. For the next term, Neustar offers the following enhancements and future considerations, which are further described in Proposal Section 1.2, System Functionality:

All enhancements required by the NPAC/SMS RFP are included in Neustar's proposal:

1. **Alternative interface**—Neustar is currently in the process of developing an <sup>“Alternative Interface”</sup> in accordance with NANC Change Order 372, which will provide Service Providers a flexible and secure alternative to the existing CMIP interface.
2. **Support of IPv6**—Neustar is currently in the process of developing a plan to implement IPv6, in accordance with NANC Change Order 447, which will allow Service Providers to migrate to newer IP version.
3. **Elimination of NPAC/SMS support of non-EDR**—Per SOW 86, Neustar complies with the requirement to eliminate non-EDR support for SOA and LSMSs.



In addition, Neustar confirms that the NPAC/SMS and LNPA service are flexible enough to accommodate requirements related to **all Future Considerations** listed in the NPAC RFP Section 7.2.

1. **Automation of Processes Between the NPAC/SMS and the Pooling Administration System (PAS)**—Neustar has proposed several automations for the interaction between the Pooling Administration System and the NPAC/SMS to increase throughput and reduce the potential for costly errors.
2. **Combining Steps for Intra-Service Provider Ports**—Neustar has proposed new functionality to the intra-SP porting process, including a one-step SOA Create/Activate capability which improves the processing Service Providers' large porting projects.
3. **Inter-Carrier Communications**—the NPAC/SMS architecture can incorporate the existing ICP and LSR processes (including Intermodal) into the NPAC, reducing Service Provider costs and simplifying operations. Because this would require significant changes to Service Provider systems and business rules, Neustar also recommends that the Industry explore other options for streamlining the Inter-Carrier Process, focused on future porting requirements rather than mere duplication of existing functionality.
4. **PSTN to IP Transition**—the NPAC/SMS is a critical component of U.S. infrastructure that will enable Service Providers to efficiently manage interconnection in the transition from the PSTN to IP; because a full description of the NPAC role requires a broader discussion of the environment, Proposal Section 1.5, Future NPAC/SMS Innovations, describes our view in greater detail.
5. **Future Mandated Changes**—the NPAC/SMS is flexible enough to support any required enhancements that comes as a result of regulatory mandates.

In addition to the above commitments, Neustar is also proposing to deliver a new NPAC Portal that unifies all aspects of the NPAC user experience into a secure, easy to navigate user interface that uses a cross-regional login. It will support all porting functions; permit real-time, chat-based interactions with NPAC Help Desk experts; provide reporting capabilities; incorporate the existing npac.com website; facilitate Industry collaboration; and much more, all in an effort to enhance operational efficiencies, ease of use, security, and facilitate access to business-critical information. The new Portal, along with Neustar's approach for the RFP's requested enhancements, is described in Proposal Section 1.2.2, NPAC/SMS Functionality.

#### **Additional Automations to Exceed Increased Availability and Throughput Requirements**

Neustar's performance against Service Level Requirements has been achieved thanks to the NPAC/SMS's redundant, scalable, 5-Layer architecture (described in detail in Proposal Section 1.2.1, NPAC/SMS Architecture), combined with hardened system monitoring and failover procedures, regular end-of-life replacement for all relevant hardware, and expert staff capable of anticipating and resolving issues before they become visible to Service Providers or consumers. The NPAC/SMS is operated with a failover capability that transfers service to our alternate site without disruption in live transaction traffic—a feat other vendors in the U.S. have struggled to achieve.

The next ten years will generate a material increase in NPAC/SMS transaction activity, and a variety of mission critical use cases. In recognition of the Industry needs, Neustar notes the RFP's requirements to increase SLR 1 availability thresholds from 99.9% to 99.99%, SLRs 5 and 6 thresholds from 95% of all transactions processed at seven per second to 99.9%, and SLR 7 thresholds for SOA/LSMS interface availability from 99% to 99.9%. We also note the new SLR 3, for Partial Service Availability (availability for even a single user). Although Neustar has

consistently performed well above these requirements over the last five years, and expects to continue doing so over the next term, we have determined that additional automation, instrumentation, and "always-on" enhancements will be required to guarantee the requisite service availability and throughput.

#### Security-Related Information

Our extensive experience with replication technology, failover execution, and the NPAC/SMS architecture will give us the insight to craft a stable but automated Failover capability. Prior to the start of the new contract term, Neustar will engage further discussions within the Industry forums to evaluate impacts and propose the least impactful and most beneficial approach to automation.

As for SLRs 5 and 6, Neustar consistently exceeds the current SOA-to-NPAC and NPAC-to-LSMS interface transaction rate SLRs of 95% of all transactions at seven transactions per second, with an average measurement of 99.9% of transactions meeting the requirement during calendar year 2012, across all U.S. regions. To guarantee continued performance at these levels, Neustar will pursue additional application-level enhancements that further optimize the allocation of interface processes to Service Provider connections, as well as perform continuous analysis of usage and performance patterns (including simulations in the Neustar Lab) to identify any opportunities for continued improvement. These potential investments are internal to the NPAC/SMS and will not result in any impacts to Service Providers.

Neustar's performance throughout 2012 for SLR 7 (SOA/LSMS Interface Availability) was 100%. In recognition of the Industry's raised requirements for the new term, and in response to Service Provider requests, Neustar is in the process of adding an Ethernet connectivity option, with a total of four redundant network providers connected to four different entrance facilities across Neustar's geographically diverse data centers.

### **Future Architectural Considerations**

The enhancements described above will not impact compliance with the NAPM LLC's requirements in the current RFP, including that of synchronous replication across Neustar's geographically diverse data centers. In our continued effort to improve service, Neustar regularly evaluates new methods and best practices, and considers various alternatives with external experts. When appropriate, we share those methods and practices with the LNPA Working Group and the NAPM LLC, to jointly evaluate new ways to support U.S. Service Providers with NPAC/SMS enhancements. In light of the raised system availability SLR, Neustar has considered various means to implement the Industry's requirements for redundancy and failover, including changes to the data synchronization mechanisms across the primary and back-up data centers.

### **Security-Related Information**

Thinking further into the future, there are additional design considerations at the Application Layer that could eliminate the need for synchronous database replication altogether. Neustar has implemented Active/Active designs in several of its commercial services, which place the burden on the Application Layer to manage failure detection and failover automation to execute high availability, data integrity, and consistency across multiple database instances and sites, rather than rely on replication technology to perform the synchronization. Moving in this direction for the NPAC/SMS would allow NPAC users to connect to either or multiple active sites at any time, improving availability and redundancy for the entire ecosystem.

As already stated, we are compliant with the Industry's requirement of ensuring synchronous replication between data centers without making the suggested changes noted above. However, in an effort to constantly improve, we believe these changes will benefit the operations of the NPAC/SMS for the entire Industry, and we look forward to engaging the Industry in discussions on this topic.



## Cloud Computing

### Security-Related Information

Neustar is in the process of deploying its next generation architecture known, as NexGen, to be used for all new services. NexGen allows us to streamline design, development, QA and deployment of services in public and private cloud environments, as appropriate. It uses a common baseline architecture that accommodates service-level selection of the operating system, virtualization, an API-layer and additional tools. We plan to migrate several existing Neustar services to the NexGen platform over the next few years starting in the coming months.

At the present time, the majority of cloud-based services are consumer-facing or internal business process services. Cloud technology is difficult to deploy (on available architectures) for services with required four or five nines availability, or latency of less than a few hundred milliseconds for the lion's share of traffic. Neustar believes that geographically diverse, redundant, but *dedicated* resources for database and application services are more appropriate for the NPAC/SMS than an immediate migration to Cloud technology, given the relatively constant flow of system usage and transaction demand.

Neustar has developed the procedures to determine what benefits and obstacles cloud computing offers to our customers, and over the long term we expect the majority of our services to be cloud based. We recommend that the Industry continue to evaluate the latency and reliability concerns attendant to Cloud technology over the next few years, and as they are overcome, consider the service provider implications of taking advantage of that technology. As the demand for transaction services increases with the deployment of IP networks and machine-to-machine, Neustar will continue to support the investments necessary to meet service provider requirements.



## NPAC/SMS Technical Design

Neustar developed and operates the NPAC/SMS using scalability, extensibility, and security as guiding principles to ensure the system meets or exceeds requirements today and into the next 10 years with the highest levels of reliability, performance, throughput, capacity, functionality, availability. The following subsections, highlighted below, describe the NPAC/SMS in detail.

- **Proposal Section 1.2.1 NPAC/SMS Architecture** outlines the five Layers that comprise the NPAC/SMS:

- Security-Related Information

- **Proposal Section 1.2.2 NPAC/SMS Functionality** provides a comprehensive list of the NPAC/SMS' current and potential future capabilities and functionalities that we develop and maintain in partnership with the Industry.
- **Proposal Section 1.2.3 System monitoring** highlights Neustar-developed and third-party systems and proactive processes in place to ensure high performance and availability of the NPAC/SMS.
- **Proposal Section 1.2.4 System Recovery and Backup** outlines the systems and processes in place to ensure continued availability of the NPAC service to the Industry in the event of an outage.

Neustar's experience and expertise as the LNPA provides a solution to the Industry that continues to deliver excellence. Our staff is dedicated to providing the highest quality service to the communications Industry. We will continue to sustain and improve our exceptional performance, and deliver new value to Service Providers, in the next term.

## 1.2.1 NPAC/SMS Architecture

The Industry has high expectations for immediate, secure, and available NPAC/SMS service in an environment of rapid change. Service Providers have come to expect the NPAC/SMS to operate to the same high standards of their critical network infrastructure and operations support systems.

Neustar has built our solution architecture in a modular fashion, through the efforts of our application engineers, network engineers, security engineers, database administrators, storage experts and operations staff. The solution is divided into five Layers described in this section. This allows our experts to focus on their specific area of responsibility, and allows changes to be delivered effectively and efficiently.

Neustar will continue to provide the Industry the highest levels of service they have come to expect. We will continue to improve the architecture solution to meet, exceed and anticipate the needs of the Industry as the communications landscape continues to evolve. Neustar designed the NPAC solution to be highly available, support high demand, be scalable and modular, and be highly secure. Table 1.2.1-1 demonstrates how we have architected the system to meet/exceed the requirements of the Industry.

**Table 1.2.1-1. Meeting/Exceeding Industry Requirements**

Requirement	Design
High availability	<ul style="list-style-type: none"> <li>• Redundancy and survivability at all Layers of the architecture</li> <li>• Stable application software design and quality assurance processes</li> <li>• Robust operational practices</li> <li>• High quality and experienced engineering and operations staff</li> <li>• Platform testing at 4X production load</li> <li>• Automated failover processes to meet new SLR 1 requirements</li> </ul>
High capacity	<ul style="list-style-type: none"> <li>• High performance and resilient hardware and software</li> <li>• Immediate access to extra online capacity</li> <li>• Regular performance testing</li> <li>• Proactive performance monitoring</li> <li>• Adherence to ISO-certified Capacity Planning Process</li> <li>• Security-Related Information</li> </ul>
Scalable and modular for new features and functionality	<ul style="list-style-type: none"> <li>• Modular hardware and software design</li> <li>• Finely tuned hardware and software architecture</li> <li>• Layered architecture</li> <li>• Optional data fields</li> </ul>

## Security-Related Information

2. Security-Related Information

3. Security-Related Information

4. Security-Related Information

# Security-Related Information



## 5. Security-Related Information

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## Neustar Response to LNPA 2015 Surveys



Security-Related Information

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# Security-Related Information

## Monitoring, Staffing, and Processes

Preventative and predictive maintenance routines are performed weekly, monthly and/or annually based on manufacturer recommendations and Industry best practices. Mechanical and Electrical system reactive and routine maintenance activities are performed using established Neustar processes and notification procedures as required. **Our continual forecast trending and analysis of capacities provide insight for predictive maintenance and future installation requirements.** Data Center personnel use Neustar cabling and labeling standards that have been developed using Industry best practices and then adapted for our unique applications and designs. We employ the use of a separate "build room" for testing, installing OS, and "burn in" of equipment before it hits the data center floor to reduce the potential for early equipment lifetime failures in production.

## The Neustar Difference

Neustar has honed our competency across all areas within the Layer—data center location, security, internal mechanical, electrical, and fire suppression systems, staffing, and processes—to meet/exceed the specific requirements of the NPAC/SMS through our many years of actual operation of the U.S. LNPA service.



As shown in Exhibit 1.2.1-2, Neustar's NPAC/SMS Security-Related Information has a proven, audited track record of exceeding and far exceeding Industry-best practices. Neustar's data centers continue to score well above "Industry Best Practices" and in many cases are best in class as highlighted in our 2012 annual operations audit (required by the NPAC Master Agreement) completed by a neutral third-party auditor. In addition, Neustar data centers are included in scope for numerous audits including Sarbanes-Oxley (SOX) and SSAE16 (formerly SAS70) without issue.

### Data Center Environment—Article 14 Audit Scores

Category	2008	2012	Trend
Data Center Environment Overall	4.60	4.67	▲
Physical Space	4.40	4.40	→
<i>General</i>	4.20	4.20	→
<i>Racks and Placement</i>	4.50	4.50	→
<i>Division of Space</i>	4.20	4.20	→
<i>Labeling and Marking</i>	4.60	4.60	→
<i>Documentation</i>	4.50	4.50	→
Electrical Elements	4.50	4.70	▲
Backup Power Sources	5.00	5.00	→
HVAC and Air Handling	4.80	4.90	▲
Smoke Detection	4.80	4.80	→
Fire Protection	4.80	4.80	→
Water Detection	4.80	4.80	→
Facilities Modification	4.50	4.50	→
Facilities Inspection	4.80	4.80	→

- 5 - Excellent performance, far exceeds industry best practices
- 4 - Above average performance, generally exceeds industry best practices
- 3 - Average performance, meets industry best practices
- 2 - Below average performance, fails to meet industry best practices
- 1 - Poor performance, falls far below industry best practices

**Exhibit 1.2.1-2:** Third-party audits validate our performance and provide valuable input on possible future enhancements.



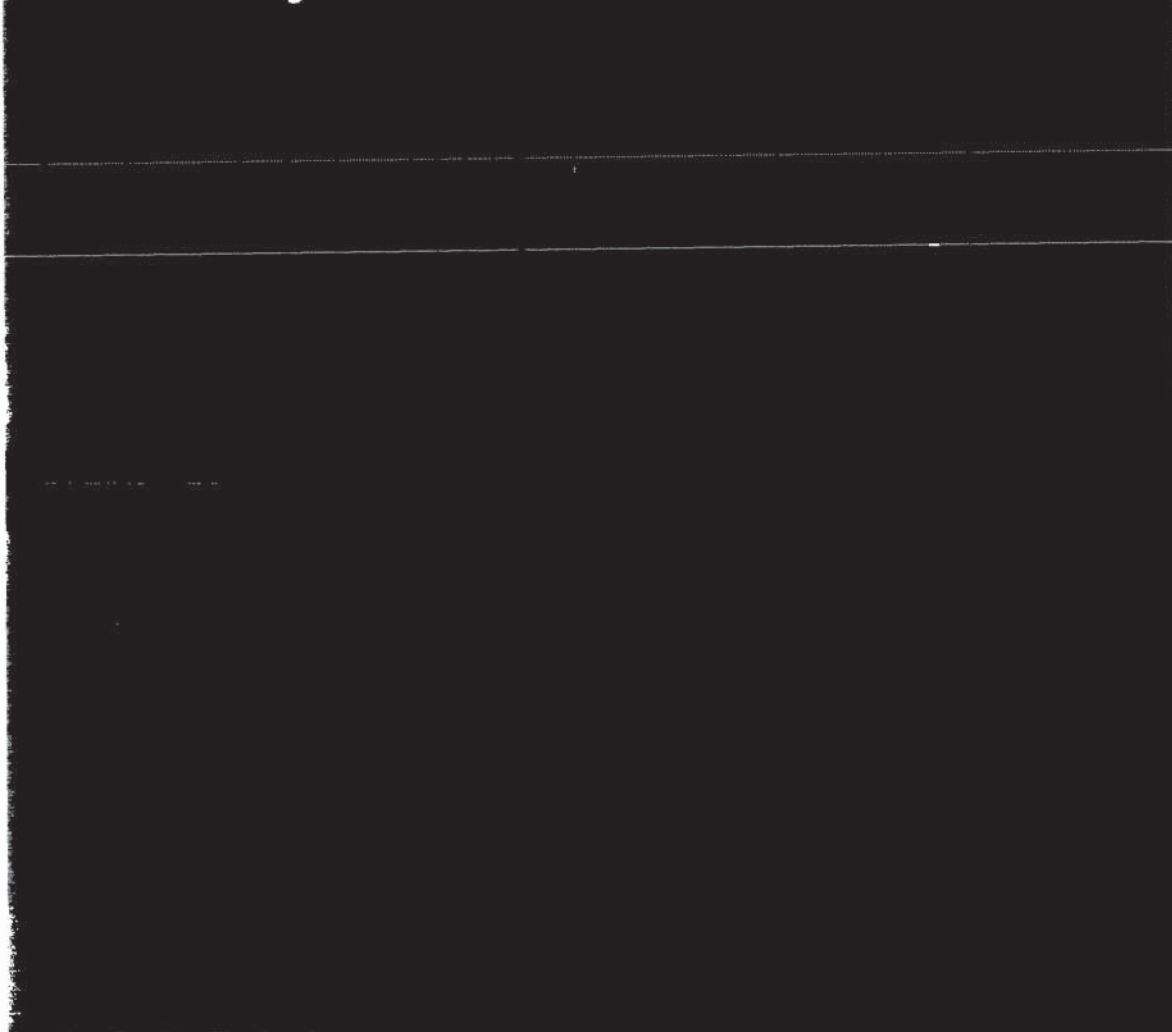
## Security-Related Information

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# Security-Related Information



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Neustar, Inc. is a public company.

# Security-Related Information



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Security-Related Information

### Network Infrastructure—Article 14 Audit Scores

Category	2009	2012	Trend
<b>Network Architecture</b>	<b>4.70</b>	<b>4.73</b>	▲
Documentation	4.70	4.70	→
Documentation Maintenance	4.50	4.50	→
Public Addresses	4.80	4.80	→
Private Addresses	4.90	4.90	→
IP Addresses Requests	4.80	4.80	→
DNS Architecture	4.60	4.60	→
Internet and Customer Connectivity	4.80	4.80	→
Network Monitoring	4.90	4.90	→
Handling Failures	4.60	4.60	→
<b>High Availability</b>	<b>4.60</b>	<b>4.68</b>	▲
WAN Access	4.60	4.60	→
Firewalls			→
VPN Concentrators	5.00	5.00	→
Routers and Router/Switches	4.60	4.70	▲
<b>IOS/Hardware and Maintenance</b>	<b>4.70</b>	<b>4.70</b>	→
IOS	4.60	4.60	→
Testing	4.60	4.60	→
Change Control	5.00	5.00	→
Out-of-Band Management	4.70	4.70	→
Emergency Maintenance	4.60	4.60	→
Hardware Inventory	4.50	4.70	▲
Ticketing Systems at Neustar	4.70	4.70	→
Customer Notification	4.50	4.70	▲

- 5 - Excellent performance, far exceeds industry best practices  
 4 - Above average performance, generally exceeds industry best practices  
 3 - Average performance, meets industry best practices  
 2 - Below average performance, fails to meet industry best practices  
 1 - Poor performance, falls far below industry best practices

**Exhibit 1.2.1-5:** Third-party audits validate our performance and provide valuable input on possible future enhancements.

Security-Related Information



Security-Related Information

Security-Related Information

Security-Related Information

# Security-Related Information



## The Neustar Difference



While the hardware described here is dedicated exclusively to the NPAC service, the exact same types of hardware are used for other applications within Neustar. This affords us extensive experience with these components outside of the NPAC operational environment. Consequently, our technical staff is well trained and very familiar with all the hardware components within the NPAC environment. All changes to NPAC infrastructure are first implemented within a different operational Neustar service. This way, changes are validated in a production environment before they are brought to the NPAC.

### 1.2.1.3.2 Four Layers of the NPAC/SMS Application Software

The NPAC/SMS Application is a very large and complex repository of application code. To help manage this complexity, the software itself is broken into the four different layers. Each layer provides a particular service or functionality within the system. Each layer is built on top of the previous layer.

See accompanying information.

## Security-Related Information

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## Neustar Response to LNPA 2015 Surveys



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# Security-Related Information

# Security-Related Information

## Security-Related Information

### 1.2.1.3.3 Ensuring High Availability of the NPAC/SMS

The NPAC/SMS is a high availability system, consistently operating at or above 99.9% availability over the past 5 years. At the application level, several architectural and functional aspects contribute to this availability:

1. **Multi-Process, Multi-Machine Architecture**—This architecture means that, in most cases, if a process stops or if even an entire machine stops, the system continues to run.
2. Security-Related Information
3. **Process Management**—This feature provides NPAC/SMS-specific automated oversight of all processes, restarting a process if it ever stops. The use of shared memory allows the NPAC/SMS to retain important information that otherwise would have been lost when the process stopped.
4. Security-Related Information

## Security-Related Information

### 1.2.1.3.4 NPAC/SMS Special Features

While the primary function of the NPAC/SMS is to manage information related to telephone numbers, the system offers a wide array of functionality that both complements basic transactions and improves the quality of the overall ecosystem. What follows is a brief overview of these features.

#### Synchronization

One of the most important functions of the NPAC/SMS is to ensure the local systems are in synch with the NPAC/SMS data. The integrity of the U.S. communications network relies on all SPs having the same addressing information, at the same time in order to properly route voice calls as well as SMS/MMS messages. To this end, the NPAC/SMS provides many different mechanisms to ensure synchronization among all communications SPs.

- Security-Related Information



## Security-Related Information

- **Bulk Data Download (BDD)**—These files provide local systems the ability to re-create or update their databases based on data extracts taken from the NPAC/SMS. BDD files are available for all types of NPAC data (SV, pooled block, network data, Service Provider, notifications). These files can be generated based on activity in a certain timeframe, or for the entire database.
- **Automated Resend**—During overnight hours, the NPAC/SMS looks for local systems that are still on the failed list for SVs or pooled blocks and resends the downloads of these objects. We designed this feature to examine previous failure reasons and if the error indicates that a modify download was failed because the record does not exist in the local system, the NPAC will broadcast a Create operation rather than a download.
- **Audits**—The NPAC/SMS queries the LSMS systems for a specified set of telephone numbers, and compares the responses to its own data. Discrepancies are noted in an audit report, and corrective downloads are sent to any discrepant LSMS systems.

## Mass Update/Mass Port

Service Providers often have a need to port large volumes of numbers in a controlled manner but require assistance to manage this process. The mass update/mass port tool was developed to provide this assistance. Mass update/mass port transactions can be defined for all types of NPAC/SMS operations (create, release, activate, modify, disconnect, and cancel).

Many options are available to control the execution of the job, including an ability to control the start time and to suppress notifications that normally would be generated. Several types of reports are available to monitor the progress and results of each job.

The mass update/mass port subsystem uses a scheduler process and a system of quotas to ensure all work is done in a fair and orderly fashion at reasonable volumes. The broadcast quota system is quite complex, and considers the following aspects when running "jobs".

- Whether the job will produce SV downloads, Pooled Block downloads, or no downloads at all
- The hour of the day the job is running;
- The day of the week the job is running; and
- Whether the job is being run by a provider or NPAC personnel.

The mass update/mass port subsystem also includes a dashboard that allows administrators to determine available broadcast quota and view projected completion times for jobs.



### Optional Fields

Over time, the Industry has been interested in adding new types of data to the NPAC. However, this was a difficult process, largely because changes to the CMIP interface required many resources for development and testing.

To address this issue, Neustar developed the concept of optional fields. With this feature, a one-time change to the CMIP interface was made to add a new string to several of the existing CMIP messages. This string takes the form of an Security-Related Information that conforms to an Industry-approved schema that defines additional data fields. With this mechanism, a new field can be added to the NPAC without changing the CMIP interface definition.



The implementation of these fields in the NPAC is done dynamically, such that adding a new field requires minimal development and can be implemented during a maintenance window.

### Pseudo-LRN

Pseudo-LRN (pLRN) provides a mechanism to add records to the NPAC that do not have an LRN associated with it. By using a specially tagged LRN value, these records are identified as pLRN and are broadcast only to systems that have opted in to receive pLRN records. Providers can opt in to all pseudo-LRN records or only for pseudo-LRN records from a certain set of providers.

### OpGUI

The NPAC/SMS is a very complicated system that can process millions of requests in a single day. Many of these requests have service level requirements that must be met to fulfill the expectations of our customers. Management of this system could prove to be a challenge, but Neustar has built an infrastructure that has allowed the NPAC administrators to successfully manage the system for many years. This infrastructure includes an administrative interface, called the OpGUI, which provides functionality required to configure and maintain the NPAC/SMS. The OpGUI provides the following functionality for a system administrator to manage the NPAC/SMS:



1. **Managing NPAC Customer Profiles**—provides the capability to add, remove and modify NPAC Customers, configure their tunable options, configure their CMIP network access, and establish service bureau relationships.
2. **System Administrator Reports**—provides system administrators the ability to generate reports for needed to manage and tune the NPAC/SMS.
3. **Mass Update/Mass Porting (MUMP) Management**—provides system administrators the capability to manage all mass update and mass porting jobs that Service Providers ask the NPAC to perform on their behalf. These functions include creating, removing and updating MUMP jobs, projects, quotas, and profiles, as well as generating MUMP reports.
4. Security-Related Information
5. **User Administration**—allows NPAC administrators to add, remove, and update accounts that grant access to the NPAC OpGUI.

6. **System Parameter Management**—allows NPAC administrators to view and update the hundreds of system level parameters provided by the NPAC/SMS.
7. **CMIP Gateway Configuration**—allows NPAC administrators to configure the processes that provide the NPAC CMIP interface. These functions include assigning provider's systems to specific CMIP gateway processes and managing the parameters associated with the CMIP gateway.
8. **Billing Collection Configuration**—allows NPAC administrators to configure the information that is collected by the NPAC/SMS for billing purposes.

In addition to the OpGUI, Neustar has also built tools that provide a real-time view into what each NPAC region is processing and how well it is handling the load. Among these tools is the **Security Page** that provides a detail view into the Dispatcher Module that directs the messaging for a region. From this tool an administrator can see all messages being routed through the system and what process is working the request. Each request received by the NPAC/SMS may pass through as many as four processes. It's necessary to understand this traffic flow to ensure the NPAC/SMS is meeting the service level requirements associated with response time and SOA/LSMS interface performance.

Another administrative tool Neustar has built is the **Security-Related Information**. This tool provides a real-time cross-regional display of the key metrics related to NPAC/SMS performance and reliability. The **Security Page** provides two columns of metrics for each NPAC region. There is a metric delta column and a metric cumulative column for each of the following key metrics.



- Monthly, daily, and five-minute SLR 3 pass, failed, and percentage passed
- Monthly SLRs 5 and 6 pass, failed, and percentage passed
- Partial failure counts for subscription versions
- Database performance including average query, rollback, and commit times
- Count of SOA or LSMS systems in recovery
- Rules engine processing active and backlog queues
- CMIP interface active queue for each SOA/LSMS
- Count of long running requests
- Machine load for the application server machines
- Count of running NPAC/SMS processes

Another key feature that contributes to our successful management of the NPAC/SMS is the multitude of **dynamically configurable settings** that control system behavior. Neustar engineers have developed this capability to make it easier to manage the multitude of options offered by the NPAC/SMS, as well as, to easily extend the service for new functionality. Settings can be defined at several different levels, including at the interface level, at the provider level, and at the overall system level. For example, we can configure the duration of medium timers at the system level, but also configure whether a particular SOA supports medium timers. The NPAC/SMS has more than





500 such settings that can be changed without requiring the system to be restarted. When a setting is changed the different modules and processes in the system automatically detect the change and make necessary adjustments. This allows the NPAC administrators that are monitoring the system to make adjustments on the fly to meet the load placed on the system each day.

#### 1.2.1.4 NPAC/SMS Database Layer

The Database Layer is between the Application Layer and the SAN Layer. It utilizes Security-Related Information operating on high availability database servers dedicated to each region. A DBMS is a set of programs that allows one to add, modify, and delete data in a database and to query it. It also provides methods for maintaining the Security-Related Information. The application servers interact with the DBMS to ensure that data stored in the SAN is up to date and accurate.

Security-Related Information

#### Database Layer Hardware and Software

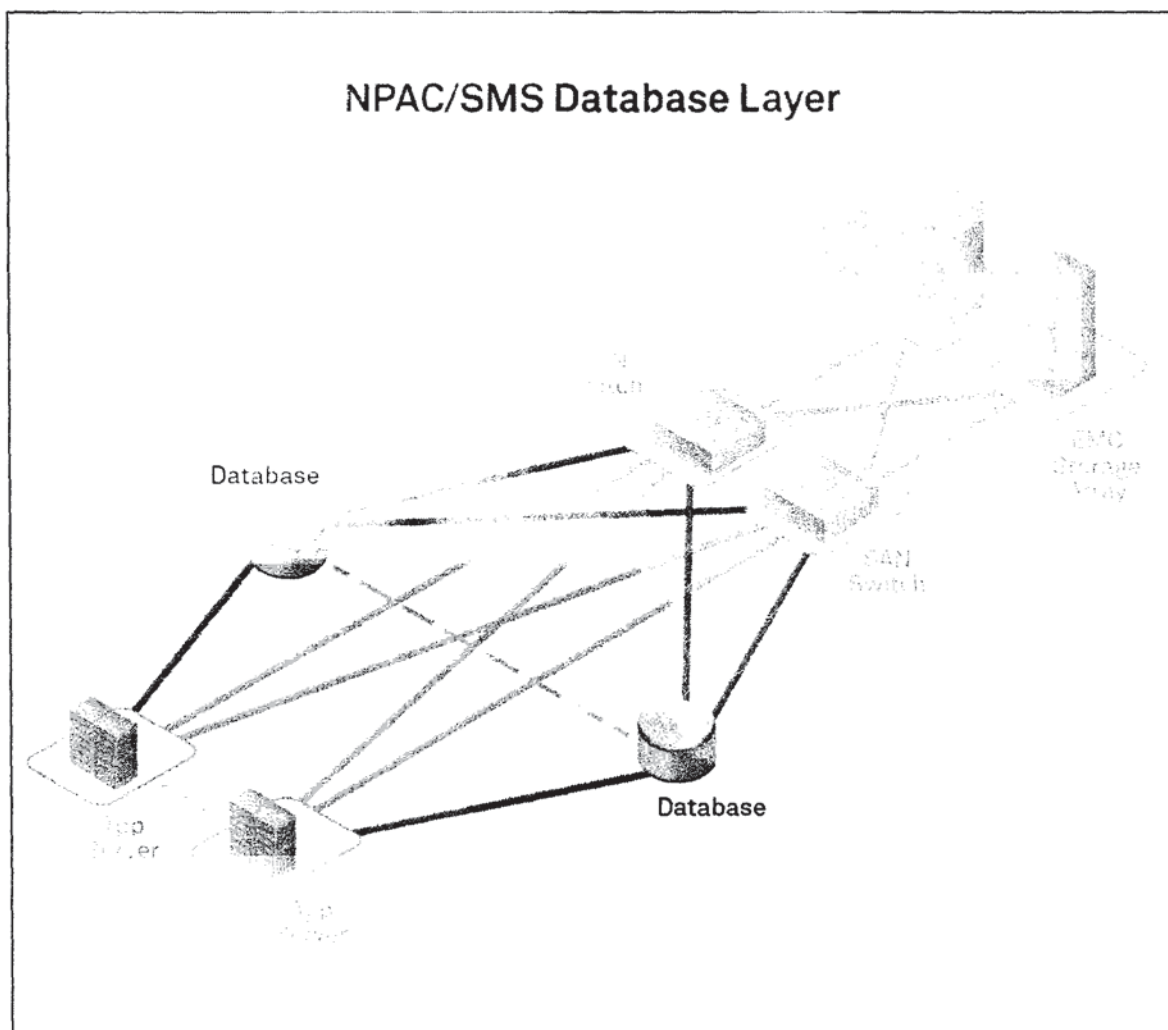
The DBMS manages the storage of the NPAC's active and historical SV records. It also manages the storage of reporting data, logs and transient data, and data stored during the processing of a transaction.

Each region has its own Security-Related Information. Each server has 4 processors and 32 gigabytes of memory. The sole purpose of these servers is to run Security-Related Information Server product. We operate the software in Security-Related Information. is the industry leader in providing database technology to transactional applications such as the NPAC/SMS. Each data center can fail over to the other in the event of an outage that requires this level of response.

Security-Related Information

The NPAC/SMS databases are reviewed yearly for SOX compliance to verify adequate internal control structure and procedures are maintained.





**Exhibit 1.2.1-9:** The Database Layer interacts with the Application Layer to ensure data stored in the SAN is up to date and accurate.

Security-Related Information

Neustar has operated the NPAC/SMS with spectacular results in consideration of SLR performance, system availability and data consistency. For the new NPAC contract, four SLRs related to throughput and response time have been increased—SLR-1, Service Availability; SLR-4, LSMS Broadcast Time; SLR-5, SOA to NPAC Interface Rates; and SLR-6, NPAC to LSMS Interface Rates. All of these SLRs are dependent on highly efficient interaction of the Application and Database Layers. We know that the system as currently configured would not consistently meet these new levels. We will have to make further changes at both the Application Layer and the Database Layer to meet the new SLRs. Given our years of experience working internally and with our vendors to improve NPAC/SMS performance, we are confident that we will be able to fine-tune the NPAC/SMS to meet these new SLRs and the high service quality that the NPAC/SMS demands



### Security-Related Information

Over the past 15 years, we have assembled a cross-functional team of network engineers, database experts, and systems architects to analyze the database traffic that comes from the database and optimize the data transmission settings at both the Network and Database Layers. Through intensive lab testing and consultation with experts from the database vendor, <sup>Security Related</sup> we have been able to tune settings such as network send and receive buffers, as well as Security-Related Information <sup>to arrive at optimal settings for the NPAC's unique traffic patterns.</sup> These efforts produced dramatic improvements in minimizing the effects of the high latency imposed by the disparate databases.

### Performance

Neustar makes use of many <sup>Security Related</sup> features to ensure the database performs optimally. Examples include: locally managed tablespaces, automatic segment space management, automatic undo management, automatic memory management, SQL (structured query language, a language for managing data in databases) Baselines, and SQL Plan Management.

Additionally, Neustar has taken the extra architectural step to ensure high performance for NPAC users by separating out a reporting database. All the reporting workload reports requested by NPAC users such as daily Bulk Data Download (BDD) are executed against this reporting database so the performance based SLRs are met in the production NPAC/SMS database. Table 1.2.1-3 describes each of these features and their benefits.



**Table 1.2.1-3. Features and Benefits of NPAC/SMS Reporting Database**

Feature	Benefits
Locally managed tablespaces	Improves database performance by moving data dictionary control into the tablespace header blocks
Automatic segment space management	Provides more efficient space utilization
Automatic undo management	Eliminates the need to manually create, size and monitor the rollback segments in the database
Automatic memory management	Significantly simplifies database administration by introducing a more dynamic, flexible, and adaptive memory management scheme
SQL baselines	Ensures consistent database query performance and reduces workload on DBAs by creating consistent execution plans
SQL plan management	Provides a mechanism for maintaining consistent SQL performance regardless of changes in optimizer version, optimizer statistics, schema changes, system settings and SQL profile creation
Separate reporting database	Removes reporting load from the operational NPAC/SMS DB to ensure high performance for NPAC users

## Security-Related Information

## Security-Related Information

## Security-Related Information



### 1.2.1.5 NPAC/SMS Storage Area Network (SAN) Layer

Neustar uses a Storage Area Network (SAN) to supply disk storage for the application and database servers. For the NPAC/SMS, we have engineered and deployed a SAN specifically designed for the Industry's stringent requirements.

#### Storage Area Network (SAN)

At a high level, a SAN provides storage in such a way that the storage appears to be locally attached to the server. The operating system communicates with SAN storage in much the same way that it would communicate with internal disk drives. Moving storage internal to the server to an external SAN provides many advantages, particularly with respect to availability, performance, and scalability. Thus, it is common for large-scale, complex applications like NPAC/SMS to use SAN storage.

Neustar's has designed the NPAC/SMS SAN Layer (shown in Exhibit 1.2.1-11) to maximize reliability, availability, and serviceability (RAS) characteristics.

1. **Reliability**—Properly instrumented storage solutions utilize self-diagnostics to provide indications of fault or problem prior to a major failure. This ensures data integrity and service performance even when an individual component fails.
2. **Availability**—Storage systems with built in redundancy allow for consistently higher uptime that is necessary to achieve four and five nine's level of availability. This allows us to predict failures and route around damaged components before any application impact occurs.
3. **Serviceability**—The simplicity and speed with which the storage unit can be maintained or repaired directly impacts uptime. A highly serviceable system is designed to be easy to work on, and automated where ever possible.

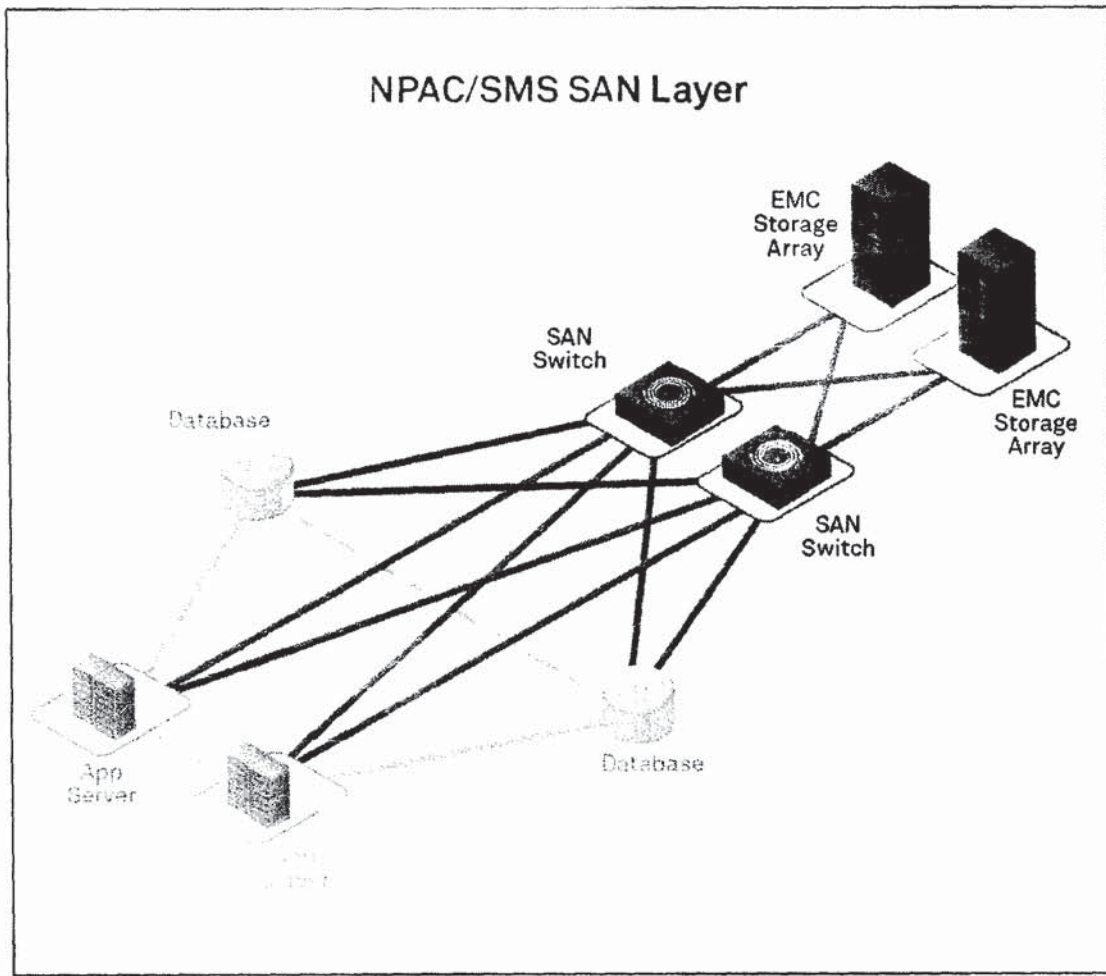


### Storage Systems–Article 14 Audit Scores

Category	2009	2012	Trend
<b>Techonology</b>	4.70	4.78	▲
<i>SAN Switches</i>	4.80	4.80	→
<i>EMC</i>	4.70	4.80	▲
	N/A	4.80	▲
	4.70	4.80	▲
<b>Implementation</b>	4.60	4.60	→
<i>Redundancy</i>	4.60	4.60	→
<i>Configuration</i>	4.60	4.60	→
<b>Management</b>	4.30	4.30	→
<i>Administration</i>	4.30	4.30	→
<i>Maintenance</i>	4.30	4.30	→
<b>Documentation</b>	4.10	4.10	→

- 5 - Excellent performance, far exceeds industry best practices  
 4 - Above average performance, generally exceeds industry best practices  
 3 - Average performance, meets industry best practices  
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**Exhibit 1.2.1-10:** Third-party audits validate our performance and provide valuable input on possible future enhancements.



**Exhibit 1.2.1-11:** The Application Layer and Database Layer utilize the SAN for disk storage to ensure higher availability and stability.

The SAN Layer is comprised of two major components.

1. **Storage Arrays**—provides disk storage to all hosts in the NPAC/SMS
2. **SAN Switches**—connects all NPAC/SMS servers to Storage Arrays

### Storage Arrays

Neustar always utilizes established technologies for the NPAC/SMS. The Storage Arrays used are EMC VMAX arrays, fully dedicated to the NPAC/SMS. This technology choice provides significant benefits to NPAC users because they are:

- Fault-tolerant
- Highly scalable, should the need arise
- Extremely high-performance and predictable in response time
- Highly instrumented, providing extensive proactive and predictive failure analysis
- Supported by an excellent Field Services organization that understands highly demanding applications

### Security-Related Information

Table 1.2.1-4. VMAX Storage Array Protection Areas

Protection	Purpose
Security-Related Information	
5. Highly trained, highly reliable field service organization from EMC, tightly integrated with Neustar teams	Enables repairs to be executed quickly and without errors
6. Standby power supply (batteries)	Enables controlled power off ensuring data integrity
7. Array maintenance is rigorously process driven, with continuous process improvement, following ITIL best practices.	Neustar's processes are designed to avoid and protect against human error

Security-Related Information

# Security-Related Information



# Security-Related Information

## Offline Storage

Neustar uses multiple means to ensure continuous availability of the NPAC/SMS. As discussed in other sections of this document, the NPAC/SMS data is continuously replicated from the primary to the secondary data center, ensuring availability of the NPAC/SMS and guarding against data loss. In addition to using data replication to avoid data loss, Neustar also creates offline media (backup) copies of the NPAC/SMS databases, as an additional means of protecting the NPAC/SMS data. These offline copies are isolated from the primary operational systems, in accordance with Industry best practices.

The offline media copies are stored in a secure, off-site location, provided by a Tier 1 records management firm. Neustar ensures that there is a secure, auditable chain of custody for NPAC/SMS media from the time any media is Security-Related Information

Neustar performs regular test restores of NPAC/SMS data, ensuring systems and procedures are working correctly.

## Staff and Operational Procedures

Neustar invests heavily in ensuring our staff is fully trained on the SAN assets for the NPAC/SMS and we employ ITIL compliant processes and procedures in managing and maintaining our SANs. The Storage team manages the NPAC/SMS SAN using Industry best practices, ensuring that all of the components are properly monitored and maintained and that new software is carefully tested before implementation. Neustar has rigorous change management procedures designed to ensure that operational changes are thoroughly planned and executed via a repeatable process.

## The Neustar Difference

The SAN Layer provides extremely high-availability storage to all NPAC/SMS hosts. The arrays and switches within the SAN are highly redundant, and specifically selected to maximize reliability, availability, and serviceability. In addition, Neustar employs highly effective change management practices and procedures to ensure that the SANs have proper proactive maintenance and capacity planning necessary to meet the relevant NPAC/SMS SLRs (e.g., 99.99% availability of the NPAC/SMS).

The NPAC/SMS Storage Network Layer is audited every year by TMNG. As shown previously in Exhibit 1.2.1-10, Neustar is consistently scored above 4.5 out of 5. A score of 4 is considered "Above average performance, generally exceeds Industry best practices" and a 5 is considered "Excellent performance, far exceeds Industry best practices".



## 1.2.2 NPAC/SMS Functionality

In the decade and a half since the inception of the NPAC, the system has evolved to offer a wide array of capabilities that benefit the provider community. As the NPAC Administrator during this entire period, Neustar has aggressively and responsibly fostered the advancement of new or improved functionality within the NPAC system. Further, Neustar maintains a vision for the NPAC into the future to continue this record of constant improvement.

The NPAC/SMS is a key component of the NPAC service and has evolved significantly over the last 15 years. NPAC/SMS functionality is developed in partnership with the Industry through various committees under the auspices of the NANC (for example, the LNPA WG).

In this section we describe the functionality that enables NPAC transactions, administrative functionality required to operate the service, and new functionality for the next term that are either proposed by Neustar or referenced in the RFP with the potential to improve value for the Industry.

<b>Functionality That Enables NPAC Transactions</b>	<ul style="list-style-type: none"> <li>• Subscription Version Processing</li> <li>• Facilitation of Industry Processes and Obligations</li> <li>• Support for National Number Pooling</li> </ul>
<b>Administrative Functionality</b>	<ul style="list-style-type: none"> <li>• Mass Update and Mass Port</li> <li>• Billing</li> <li>• Reporting</li> </ul>
<b>New Functionality for the Next Term</b>	<ul style="list-style-type: none"> <li>• Proposed Enhancement:             <ul style="list-style-type: none"> <li>◦ New NPAC Portal</li> </ul> </li> <li>• RFP Required Enhancements:             <ul style="list-style-type: none"> <li>◦ Security-Related Information</li> <li>◦ Support of IP Version 6</li> <li>◦ Elimination of NPAC/SMS Support of non-EDR</li> </ul> </li> <li>• Future Considerations:             <ul style="list-style-type: none"> <li>◦ Automation of Processes Between PAS and NPAC</li> <li>◦ Combining steps for intra-SP ports</li> <li>◦ Inter-carrier Communications</li> <li>◦ PSTN to IP Transition</li> </ul> </li> </ul>

## 1.2.2.1 Functionality that Enables NPAC Transactions

### Subscription Version Processing

The majority of code in the Security-Related Information provides functionality that enables NPAC/SMS transactions. Records created in the NPAC/SMS by the users are called subscription versions (SV). SV processing can be divided into four main categories:

1. Enforcement of business rules
2. Data validations
3. Dissemination of data
4. Synchronization

### Enforcement of NPAC/SMS Business Rules

Processing an NPAC/SMS transaction is a complicated process that considers thousands of potential scenarios and invokes various business rules based on the combination of scenarios involved. Just a few of the factors that must be considered include portability type (Inter-provider, Intra-Provider), existence of pool blocks, single-TN versus ranged-TN operations, support of optional capabilities (e.g. pseudo-LRN, optional data fields), timer settings for the involved carriers, and business hour calculations (days of the week, holidays).

The NPAC/SMS uses a complex rules engine to manage over a thousand business rules that can interact in, literally, millions of ways. Integrating a new business rule to implement a new Industry rule requires a unique mix of skills, including a deep understanding of NPAC transactions, an understanding of the specific new feature, and intimate knowledge of how the rules engine works within the NPAC/SMS to determine the impact of the new rule on existing rules. Neustar has developed this expertise over the course of many years in its role as the NPAC Administrator.



The following five business rules: timers, conflict status, first port notification, snapback, and code recovery, serve as examples of the complexity of enforcing the NPAC/SMS business rules.

### *Enforcement of NPAC Business Rules: Timers*

The timers used by the NPAC to determine when to shift control of the port from the old SP to the new SP are referred to as the T1 and T2 timers. At the start of the T1 interval, at the end of the T1 interval (the start of the T2 interval), and at the end of the T2 interval, the NPAC generates a notification to the old SP to remind it that a pending SV has been created by the new SP and to request a reaction (concurrence or objection to the impending port). There are three sets of T1/T2 timers: two sets ("long" and "short") are selected in advance by the Service Provider. Each Service Provider selects either of the timers for port-out transactions and either of the timers for its port-in transactions. These two selections become part of the Service Provider's NPAC/SMS profile. A third set of timers, referred to as "Medium Timers" is imposed on a porting transaction when the old SP determines that the port meets the FCC's One-Day Porting criteria.



The set of T1-T2 "short" timers involves a pair of one-hour intervals and typically is selected by wireless SPs. The set of T1-T2 "long" timers involves a pair of nine-hour intervals and typically is selected by wireline SPs. The longer interval is selected by wireline SPs to accommodate the added complexity of having to assign outside plant to implement service for their customers. The medium timers are a pair of three-hour intervals. Unless the medium timer has been determined by the old SP to apply to the port, the NPAC looks at the port-out timer shown on the old SP's profile and the port-in timer shown on the new SP's NPAC profile and selects the longer to determine how long the old SP remains in control absent the old SP reacting to the NPAC/SMS notification about the pending SV creation.

The timers run during NPAC/SMS "business hours" and "business days." The NPAC/SMS is available for use at all times, except during maintenance intervals, but the timers run only during "business hours." The SP selects either Sunday through Saturday or Monday through Friday for its business days. The Sunday-Saturday business days have business hours of 9:00 a.m. to 9:00 p.m., in the predominant time zone of the region. The Monday-Friday business days have business hours of 7:00 a.m. to 7:00 p.m., Central time. The SP's selection of business days/hours is noted on its NPAC profile. The business days/hours choice is independent of the short/long timers choices. Wireline SPs typically choose the Monday-Friday set while wireless SPs typically chose the Sunday-Saturday set.

When a port meets the FCC's criteria for a One-Day Port, the old SP invokes the medium timers, indicating the choice when it submits its matching "pending SV create" request to NPAC/SMS. The NPAC then ignores the business days/hours and long/short timer settings on the NPAC/SMS profile for the two SPs involved in the port and uses the medium timers:

- T-1/T-2 timers are each three hours
- Business days are Monday through Friday
- Business hours are 7:00 a.m. to midnight, in the region's predominant time zone

The new SP is not obligated to request a next day due date even though the One-Day Porting scenario requires that it be allowed.

#### *Enforcement of NPAC Business Rules: Conflict*

When the new SP sends its "create pending SV" request to the NPAC/SMS, the NPAC/SMS sends a notification to the old SP. Thus if the LSR never made it to the SP actually serving the number, the NPAC/SMS notification serves as an alert that something is wrong. Likewise, if the old SP received the LSR, but has not issued its FOC, the NPAC/SMS notification serves as an alert that a port is being planned even without a FOC having been issued. Because the old Service Provider now is aware of the porting record being created in the NPAC/SMS, the old SP may have time to prevent or at least delay the port until it can contact the new SP to work out the problem.

The NPAC/SMS process allows the old Service Provider to put a pending port into "Conflict", thus preventing the new Service Provider from activating the port for 6 hours (or sooner, if the old SP removes the conflict). In cases where there has been no LSR received or no FOC issued, the old SP can put the pending SV record into conflict and prevent activation for an indefinite period. The design of the NPAC/SMS enforces the Industry's rules allowing the old SP to retain control of a port for a defined interval. The delay interval values also are defined by Industry.



In addition to the T1-T2 timer process described above, the old SP can extend its control of a port by setting the conflict flag in its "old SP pending SV create" message to "false." For both long and short timer cases, this extends the interval by six hours from the time NPAC/SMS receives the conflict indication. If the port involves a "medium timers" scenario, this extension is 2 hours. Once the interval expires, the new SP can remove the conflict and proceed with the port.

On occasion, the new SP may send its LSR to the wrong old SP or may fail to send it altogether. Should that new SP attempt to create a pending SV record, in anticipation of porting a telephone number away from the old SP, the NPAC/SMS (routinely) sends a notification to the old SP to say that a pending SV has been created and to request the corresponding old SP "create pending SV request" message be generated. The old SP, realizing no LSR was received, can send its matching "create pending SV" request with conflict indicated and the conflict "cause code" marked "50" (no LSR received). These indicate to the NPAC/SMS that the pending SV should be placed into a Conflict state and remain there until the old SP removes the conflict. The same conflict sequence could occur if the scenario were that the old SP received the LSR, but had not yet issued its FOC. In this case, the conflict cause code would be "51" (no FOC issued).

#### ***Enforcement of NPAC/SMS Business Rules: First Port Notification***

Some SPs do not establish translations in their networks when an NPA-NXX code is defined as portable and instead wait for the first port to occur in the NPA-NXX (or for the first thousand block to be created and assigned to a switch different from the one to which the NPA-NXX is assigned). The NPAC/SMS broadcasts a first-port notification when it receives the "create pending SV" request and prevents activation of the SV or block for five business days. The Industry requires this delay to enable those carriers that have not yet prepared their network to recognize the NPA-NXX code is portable to update their switch translators and begin doing data base dips for calls to numbers in the code.

#### ***Enforcement of NPAC/SMS Business Rules: Snapback***

When a consumer abandons a number he has ported, the current SP is not permitted to use the number for another of its customers and must return it to the original SP, after providing intercept services. This is called snapback. This is accomplished by deleting the NPAC/SMS record of the ported number. When a ported number record is deleted, the NPAC/SMS notifies the code-assignee (or block assignee, if a pooled block is involved) that the number is being returned to its inventory. The NPAC message includes the date the number was removed from active service, as indicated to the NPAC/SMS by the SP returning the number, thus enabling the code (or block) assignee to apply an appropriate aging interval. After the snapback message is sent, the NPAC/SMS broadcasts a delete message to all the LSMs.

#### ***Enforcement of NPAC/SMS Business Rules: Code Recovery***

The introduction of LNP has also impacted the NPA-NXX code recovery process, where a code is assigned to a Service Provider and then later is returned to the NANPA code pool. Before the introduction of LNP, a recovered code was not contaminated, i.e., all 10,000 telephone numbers associated with it would be available for use by the next code assignee. However, a code that is defined as portable, or pooling enabled, that is recovered after it has been assigned, is likely to have had numbers ported from it. If the code is returned to the NANPA, and no action is taken to clear out the ported number records, the recovered code will not be pristine. When the code is later re-assigned, the new code assignee inadvertently may cause double assignments of telephone numbers that already are in service as ported numbers served by other SPs. To protect the code recovery process, the NPAC/SMS will

not allow deletion of network data when subordinate TN-level data exists, i.e., when there are ported numbers. Contaminated NPA-NXX codes are not returned to the NANPA pool until the NPAC's telephone number-level records are cleaned out. Because code recovery often involves a defunct SP, there may be no one available to agree to the deletion of the defunct SP's NPAC/SMS records. In these cases, the NANPA obtains written direction from the state regulator, requesting that the NPAC delete the defunct SP's code record and any associated records that must be deleted to allow the code's deletion. As a result of the NPAC's action, the recovered code contains the full 10,000 numbers for use by the new code-assignee when the code eventually is reassigned.

#### Data Validation

Beyond enforcing Industry-defined porting processes, the NPAC/SMS validates the data it receives before completing the transaction and making the data available for dissemination. Data validations can be divided into format validations, verifying that format of the data provided conforms to Industry practices, and relationship validations, verifying the data provided against other NPAC data, Industry standards, and data from other sources such as NECA and NANPA.

##### *Data Validation: Format Validations*

One type of format validation verifies the structure of the data: specifically number or characters and whether they are numbers letters or both. Examples are an LRN, which must be 10 numeric characters; an NPA-NXX code, which must be 6 numeric characters; a Destination Point Code, which must be 9 numeric characters; and a SPID, which must be 4 alphanumeric characters.

Another type of format validation involves compliance with Industry rules, such as confirming a Subsystem Number is present when a Destination Point Code is present or that the Destination Point Code entry conforms to common channel signaling (SS7) address range restrictions.

##### *Data Validation: Relationship Validations*

Relationship validations involve verifying the data provided against existing data, such as whether the LRN entered on the ported number record exists and is associated with the New Service Provider involved in the record. Other examples are whether the value entered in the AltSPID or Last AltSPID field is a valid SPID in the NPAC's customer data, whether the value entered as the SV Type is among the defined SV Type values, and whether the NPA-NXX of the porting telephone number shown on the record exists in the NPAC's network data.

Somewhat more complex relationship validations involve confirming the SPID from which the number is being ported actually is the Service Provider currently serving the telephone number. This validation requires the NPAC/SMS to determine whether there is a ported number record already for the telephone number and, if so, to confirm the SPID associated with that record represents the "porting from" Service Provider shown on the "porting to" Service Provider's port request. If no ported number record exists, the NPAC/SMS then must check to see whether the telephone number is part of a thousand block associated with the "porting-from" Service Provider's SPID. And failing to find such a thousand block record, the NPAC must then determine whether the telephone number's NPA-NXX code is associated with the "porting from" Service Provider's SPID.



More complex validations check for relationships such as whether the Destination Point Code used is among those the Service Provider has listed as its valid DPC codes for use on its NPAC/SMS records. Another of these complex validations occurs when a Service Provider attempts to open an NPA-NXX code in the NPAC/SMS network data. Before the code can be opened, the NPAC/SMS determines to what Operating Company Number (OCN) the North American Numbering Plan Administrator (NANPA) has assigned the NPA-NXX code. That OCN then is compared with the list of OCNs associated with the SPID of the Service Provider attempting to open the code. The NPAC/SMS also confirms the code is being opened in the proper region. In two NPAC regions, this proper-region determination must be done at the rate area level because the regional boundary does not exactly track the state boundary, making it necessary to handle one NPA in two regions. Table 1.2.2-1 provides a summary of some of the validations performed by the NPAC/SMS.

**Table 1.2.2-1. Examples of Validations**

Field	Validation
<b>Simple Format Validation</b>	
LRN	must be 10 numeric characters
NPA-NXX	must be 6 numeric characters
DPC (SS7)	9 numeric characters
SPID	must be 4 alpha numeric
<b>Compliance with Industry Rules</b>	
DPC	must be accompanied by SSN entry
SSN	when present, must be 000
LRN	must be same LATA as TN's LATA
First port in NPA-NXX	5 business day delay before activation permitted
LRN	must be open in network data
LRN	must be network data owned by new SP
altSPID	must exist as SPID in customer data
Last altSPID	must exist as SPID in customer data
SV type	must be selected from defined values
NPA-NXX	must be open in network data
old SP SPID	accurately refers to current SP
DPC	must be known to be valid for SP creating record
NPA-NXX	SP SPID must be associated with code's OCN
NPA-NXX	allow open only in region serving the NPA *
<b>Network Data Relationships Tracked</b>	
OCN	OCNs associated with a SPID
DPCs	DPCs associated with a SPID

Field	Validation
NPA-NXX	NPA-NXXs associated with a SPID
NPA-NXX-X	NPA-NXX-Xs associated with a SPID
LRN	LRNs associated with a SPID
LATA	LATA associated with each NPA-NXX
NPA	NPAs associated with each region *
SP Type	each SPID's SP type
Customer Name	Customer name associated with each SPID

\* NPAC region boundary crosses state line in Kentucky, so proper region to open an NPA-NXX code is validated at the rate area level

#### Dissemination of Data

Once the NPAC/SMS has applied its processing rules on a request and updated its internal database, it must disseminate this information to the LSMS and SOA systems. Real-time broadcasting is the primary mechanism for this dissemination. Most broadcasts are sent to the subtending LSMSs, though some go to the SOAs as well.

During the porting process, the NPAC/SMS acts as a hub, connecting pairs of Service Providers (SPs) that are coordinating the transfer of a telephone number. As each party performs a step in the process, the NPAC/SMS issues real-time notifications to their SOA systems to keep all parties abreast of the progress and make them aware of their obligations. Notifications are issued for object creation (port initiation), attribute value changes, status changes, and timer expirations. Though most NPAC/SMS messages to SOAs involve information pertinent to a single SOA, some NPAC/SMS transmissions are broadcasts to all SOAs; for example, the creation of SPIDs, NPA-NXXs, and the dash-X representation of pooled blocks.

NPAC/SMS users connect a system called a Local Service Management System (LSMS) for receiving and propagating NPAC/SMS transactions in their systems and networks. NPAC/SMS transactions are updates to the Industry on changes in status related to telephone numbers. These changes in status can be a move from one switch to another, one Service Provider to another, information for a non-ported TN different from that associated with the TN's NPA-NXX code, assignment of numbering resources (pooled blocks, NPA-NXX codes) to a Service Provider, as well as hundreds of other status changes. Once a transaction is validated and updated in the NPAC/SMS database, a broadcast of the SV is sent to NPAC/SMS users through the LSMS interface. The Service Provider's LSMS updates network databases and operations support systems. They can also distribute the data in turn to their clients, such as smaller SPs that cannot justify operating an LSMS system.

In the case of an NPA split, the NPAC/SMS broadcasts an "add" of the new-NPA versions of the NPA-NXX codes impacted by the NPA split when the split is entered into the NPAC/SMS. At the end of the Permissive Dialing Period, the NPAC/SMS broadcasts a "delete" of the old-NPA versions of the NPA-NXX codes impacted by the NPA split.



### **Synchronization**

One can think of the LNP Ecosystem as fundamentally a complex distributed database. The NPAC/SMS itself maintains the master copy of the LNP data and one of its primary goals is to ensure that remote systems have an accurate copy of that data. To this end, synchronization with remote systems is critical and the NPAC/SMS provides many layers of mechanisms to ensure consistency.

#### ***Synchronization: Recovery***

Local systems are not always online, and from time to time are not able to process messages correctly due to a variety of platform issues. The NPAC/SMS implements a feature called recovery that allows a local system to retrieve messages they have missed due to such a problem. The recovery process can be done for a specific time frame, or the system can ask the NPAC/SMS to deliver accumulated message that it has missed (this is called "Send What I missed" or SWIM recovery).

In the Security-Related Information, rather than using recovery, the NPAC/SMS will retransmit messages that either could not be delivered or were not responded to. This simplifies the interface, reducing the burden on local system implementers.



#### ***Synchronization: Failed Lists and Resend***

When an SV or pooled block broadcast is received by an LSMS, it sends an acknowledgement to the NPAC/SMS. The NPAC/SMS keeps track of the LSMS responses for each broadcast. After a predefined interval, any LSMS that has not acknowledged the broadcast is placed on a "failed list." Each night, during a period of low transaction volume, the NPAC/SMS resends the broadcast to any LSMS that is on the failed list. For modify broadcast failures, the NPAC/SMS notes whether the LSMS failure was due to a "no record" rejection and for those casts sends a create message rather than rebroadcasting the modify transaction.

#### ***Synchronization: Bulk Data Downloads***

Bulk Data Downloads (BDD) provides data extracts from the NPAC/SMS to local systems requesting them. Local systems retrieve the BDD files from the NPAC/SMS and can use the files to validate their own database, re-populate their database after a loss of data, or build the initial database for a new system.

There are several different types of BDD files, based on the type of data they represent. There are BDD files for Subscription Versions, Pooled Blocks, DashX, NPA-NXX, LRN, and Service Provider. For each of these files, the BDD can be generated with an "active view" that includes currently active objects, or with a "latest view of activity" that captures all activity (including deletions and modifications) within a specified time frame.

We also provide a BDD for SOA notifications. This is available based on a specific time-frame and contains only notifications for the provider requesting the data.

***Synchronization: Audits***

The NPAC/SMS also supports audits of the LSMSs. With the audit feature, the NPAC/SMS queries one or more LSMSs, and compares the results of these queries with its own data, issuing corrective downloads as necessary. Audits can be initiated for a single TN, a TN range, or for a time range, and can be initiated by a SOA system or by the NPAC Administrators. The NPAC/SMS issues random audits as part of its housekeeping processing as a proactive consistency measure.

***Synchronization: Query***

Users can initiate queries to the NPAC/SMS and use the results to reconcile their systems. Responses are provided immediately. Queries can be for any data in the NPAC/SMS including TNs, ranges of TNs, SPIDs, DPC/SSNs, etc.

**Facilitation of Industry Processes and Obligations**

Because the NPAC/SMS is an authoritative database for TN administration it must support various functions that impact numbering as well as various entities that rely on numbering data. The NPAC/SMS has software that supports:

- Mergers and acquisitions of communications companies—SPID migrations
- Area code splits—recognition of dual NPAs for TNs
- Reseller identification—altSPID, last altSPID
- Administrative services that rely on NPAC—LEAP and WDNC
- IP routing—URI

**Mergers and Acquisitions**

The NPAC/SMS facilitates mergers and acquisitions through SPID migrations, a process that allows the SPID associated with the ported telephone numbers, thousand blocks, LRNs, and NPA-NXX codes to be changed without requiring that the data be broadcast to the LSMSs. Instead, the NPAC/SMS distributes information that allows the migrating records to be identified. The record changes are then made independently by each SOA and LSMS operator and by the NPAC/SMS during a regular NPAC/SMS maintenance window.

The NPAC/SMS offers on-line tools for both Service Providers and NPAC Administrators to define and manage these migrations. The tool implements the workflow of the migration, ensuring that both Service Providers in the migration have concurred with the activities. During the concurrence phase, automated e-mails are sent directly to the involved providers. After the migration is approved, automated emails are sent to all providers. The system also automatically validates the migration on a daily basis, and generates preliminary data files, making them available for providers at the FTP site. On the date of the migration, the system automatically cancels any pending subscription versions involved in the migration, provides reports to SPs impacted by the cancelled SVs, initiates message delivery and data updates for on-line migrations, and delivers files to Service Providers' FTP sites with instructions for handling the SPID migration off-line.



### **Area Code Splits**

The NPAC/SMS also performs automated processing for NPA splits. The system accepts data files from Industry sources that describe NPA split activity. When a new split is added to the system, the NPAC/SMS broadcasts all the codes involved with the split, but with their new NPAs. During the Permissive Dialing Period, the NPAC/SMS automatically translates incoming requests—queries, ports etc., changing references to the old NPA to the new NPA. At the end of the Permissive Dialing Period, the NPAC/SMS broadcasts a delete of the old-NPA versions of all the codes involved in the split.

### **Reseller Identification**

There are instances where NPAC/SMS data can reflect information pertinent to the provider behind a PSTN Service Provider. For example, a "class 2 interconnected VoIP" provider must rely on its PSTN partner as a source of telephone numbers and to act as a PSTN gateway. It also must rely on its PSTN partner to create information in the NPAC/SMS database to identify it as the serving provider for the telephone number as well as to indicate other information pertinent to the service arrangement. Neustar has augmented the NPAC system to allow for the optional provisioning of reseller information through the "altSPID" optional field. This field is used to identify the VoIP provider that is actually providing telephone service for the number. If the telephone number involved were native to the PSTN partner's switch, i.e., not ported, then the PSTN partner would need to perform an intra-SP port at the NPAC/SMS to establish the number record in the NPAC/SMS database. If the telephone number already were ported, the PSTN partner would need to modify the NPAC/SMS record to populate the altSPID field. If the VoIP provider were prepared to accept calls directly in the form of internet traffic, the PSTN partner could indicate on the NPAC/SMS record that the "SV type" is "class 2 interconnected VoIP."

### **Administrative Services That Rely on NPAC**

The NPAC/SMS provides additional services to satisfy the needs of law enforcement to be able to accurately and immediately identify the ownership of any telephone number. These functionalities include access to additional interfaces such as Interactive Voice Response and Web and API access.

The NPAC system provides an additional service to satisfy the needs of Telemarketers and Collection Agencies to avoid placing calls to wireless numbers using automatic dialers and recorded messages, which is expressly prohibited by the FCC.

### **IP Routing**

The NPAC system supports the transition from TDM (PSTN) to non-TDM (IP) inter-carrier call routing. As the PSTN transition to IP unfolds, it will be necessary for every TN assigned to an ISP customer to be associated with both an LRN and a URI. The NPAC/SMS record for TNs and blocks includes fields for VoIP URI, SMS URI, and MMS URI.

## Support for National Number Pooling

Number Pooling is a process that is vital to the country because it conserves scarce numbering resources. Pooling is implemented using NPAC/SMS functionality. Neustar has evolved support for number pooling to a system that is fully aware of pooling and the pooled block lifecycle. The NPAC/SMS has many features incorporated specifically to support number pooling which can be integrated with the Pooling Administration System (PAS). Specifically, the NPAC/SMS and PAS can communicate electronically to exchange information on pooling operations that need to be executed in the NPAC/SMS and automatically reflect said completion in PAS. This will result in increased accuracy and timeliness.



Another evolution regarding Pooled Block processing concerns LSMS support for pooled blocks. At the inception of number pooling, not all LSMS systems supported the concept of pooled blocks, also known as Efficient Data Representation (EDR). EDR is a technique to represent 1,000 consecutive numbers as a single record, for example 703-571-3 represents the numbers 3000-3999 associated with the 703-571 NPA-NXX. As a result, the NPAC had to broadcast 1000 SVs to non-supported LSMS systems in lieu of the pooled block. Recently, the Industry achieved 100% support for Pooled Blocks, leading to a request for SOW 86 to remove support for non-EDR LSMS systems. Neustar complies with the requirement from RFP Section 7.1.3 to eliminate non-EDR support for SOA and LSMSs.



The NPAC/SMS still must support some non-EDR features, such as the ability to respond to an NPAC user's query for an individual pooled number. Although not a part of the EDR functionality, Neustar remains prepared to provide a Bulk Data Download (BDD) that includes individual number data for pooled numbers in cases where the customer is not yet able to process the now-standard EDR BDD.



### 1.2.2.2 Administrative Functionality

As the LNPA, Neustar needs certain administrative functionality to provide a high level of service to our users. To this end we have:

- Developed a tool to update large volumes of NPAC/SMS data (MUMP)
- Implemented a billing capability
- Deployed a reporting function for the Industry

#### Mass Update Mass Port (MUMP)

Service Providers often have a need to port large volumes of numbers in a controlled manner. For various operational reasons, executing these projects over the SOA interface is inefficient. The MUMP subsystem was developed to provide the tools and processes to manage such projects.

The initial version of MUMP allowed for updates of only existing records and could be used only by NPAC personnel. Over the course of many years, MUMP has evolved into a very complex subsystem that supports all types of portability operations (create, release, activate, modify, disconnect, and cancel).

MUMP allows a user to express operations as a "job". It uses a system of quotas and priorities to ensure that all work is done in an orderly fashion at reasonable transaction volumes and includes a dashboard to project completion dates for each job. The feature is available for both Service Providers and NPAC personnel. Jobs can be defined in



terms of a list of TNs or as a query. The NPAC Portal can upload spreadsheets, breaking the data up into separate jobs as required.

Many options are available to control the execution of the job, including an ability to control the start time and to suppress notifications that normally would be generated. Several types of reports are available to monitor the progress and results of each job.

### **Billing**

Billing for the NPAC service has changed substantially over time. Fortunately, the system was designed modularly to accommodate these changes.

The NPAC system can generate all data necessary to track system usage in a variety of ways to facilitate billing processes. The NPAC/SMS logs all transactions, recording the type of operation, the telephone number(s), Service Provider, and date/time. A module extracts this information into a separate repository where it can be summarized and reported. Another module implements the actual generation of customer bills based on the current contract stipulations.

The billing code within the NPAC/SMS is tested with every major release and results are provided to an independent auditor.

### **Reports**

The NPAC/SMS provides a wide array of user-generated reports. From within the NPAC Portal, users can generate Standard Reports on the following types of data:

- Subscriptions
- SPIDs and User names
- Network data (NPA-NXX, NPA-NXX-X, LRN, NPA Splits)
- Number pooling
- Audits
- Notifications
- Security data
- Transactions

These reports include report-specific filters to target the desired data. The reports can be scheduled to run periodically. The NPAC Portal also provides the ability to generate Ad-Hoc reports on subscription versions. In these reports, the user can specify the fields desired and a complex filter can be created. Additionally, NPAC personnel provide reports to the Industry or to the NAPM LLC. Examples of these reports include:

- Standard reports, such as the customer's NPAC Profile
- Ad Hoc reports, which are individually designed to meet customer request
- Results of MUMP projects, such as completion counts and failed transactions details
- Results of SPID migrations, such SPID-specific reports of pending SVs canceled in support of the migration
- Bulk data download (BDD) reports (active and delta) to establish or re-build LNP databases
- Root cause analyses (RCAs), to describe root cause of service interruptions
- Monthly "billable" transactions
- Monthly "billable" transactions, broken into p-LRN and conventional categories

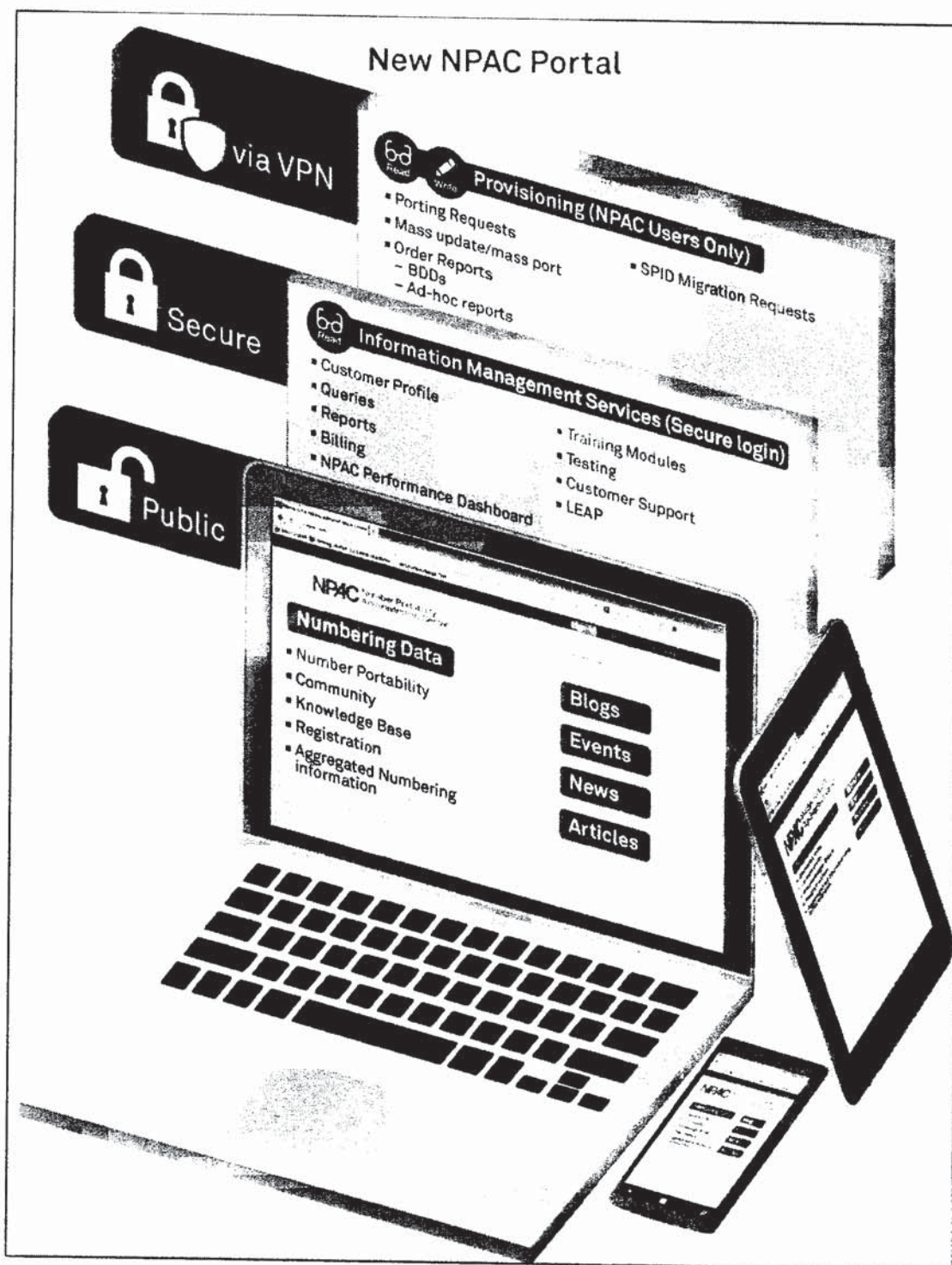
### 1.2.2.3 New Functionality for the Next Term



#### **Proposed Enhancements: NPAC Portal**

Neustar has a record of consistent investment into the NPAC user experience, understanding that thousands of people across the Industry rely on the NPAC to accomplish critical business functions, from supporting customer port requests to network maintenance to number inventory administration. We also recognize that the LNPA is both a trusted resource for information regarding numbering policy and a common hub for collaboration and issue resolution between Service Providers and their partners. For these reasons, in 2011 Neustar, working with the Industry, implemented a complete technical and functional overhaul of the NPAC.com website, an improvement which received high marks from all user types.

As usage of the NPAC grows in volume, scope, and complexity, further automation and optimization of the NPAC experience is required. To that end, Neustar is planning continued investment into the NPAC's online interfaces—specifically, the creation of a single NPAC Portal (highlighted in Exhibit 1.2.2-1) which will be a one-stop shop and provide access to reports, billing information, secure and authenticated access to NPAC regions etc. The NPAC/SMS Portal will reduce NPAC User expenses by consolidating existing screens and interfaces, streamlining access to critical reports and Industry knowledge, and by automating customer support tasks.



**Exhibit 1.2.2-1:** The new NPAC Portal, available via computer, smartphone, or tablet, provides NPAC users more valuable capabilities and a streamlined experience.



The NPAC portal will be designed and implemented in partnership with the LNPA WG and the NAPM LLC prior to the start of the next NPAC contract term, with the following guiding principles in mind:

- Operational efficiency and ease of use
- Security and user authorization/authentication
- Effective Industry collaboration and communication
- Access to business-critical information

**NPAC Portal: Operational Efficiency and Ease of Use**

The NPAC portal and all its functions should be accessible via an online interface securely accessible over the Internet. A single, unique, cross-regional user ID and password will be assigned to each authorized individual accessing the NPAC with the aim of eliminating the need for swivel-chair operations and reducing the number of logins required for an individual user.

All porting functions supported by the NPAC/SMS will be available through the NPAC portal, as they are today via the existing NPAC LTI. Added to the interface will be integrated, context-sensitive help, describing not only the system behavior and recommended usage, but also relevant Industry standards, best practices, and policy. The portal will also permit real-time, chat-based interaction with experts at the NPAC help desk for those users requiring additional assistance.

As part of the design process for the user interface itself, given the complexity of information and processes supported by the NPAC, Neustar will convene dedicated user group meetings for the Industry in collaboration with the LNPA Working Group and will make available experts in human factors to consult with the Industry on the most efficient usage models.

**NPAC Portal: Security and User Authorization/Authentication**

Confidentiality of NPAC data and user behavior, along with verified authorization for porting activity, remain the highest priority for the user community. Therefore, the NPAC portal will leverage our comprehensive set of tools that form our identity and access management system.

To maintain maximum flexibility along with security, the portal will employ the model of an Account Administrator for each NPAC User company, with privileges to control user access in partnership with LNPA personnel. The Account Administrator will manage all user access within that company, specifying the various levels of authorization permitted by the portal, including:

- Which NPAC regions each user can access
- Which functions each user is permitted to perform, including:
  - Query-only



- Porting and pooling (i.e. Creates/Activates/Modifications/Disconnects)
- Request reports and BDDs
- Large project and SPID migration scheduling
- Access to NPAC billing and system monitoring data

The domains of the Account Administrators will be managed by LNPA personnel subject to the regional NPAC User Agreements as well as the various privileges assigned to types of users, i.e., SPs and providers of telecommunications-related services (PTRS). This model also will permit ancillary applications such as LEAP and the Intermodal Ported TN Identification service to be securely offered using the same framework—given that appropriate restrictions on data access will be maintained centrally based on a flexible user authorization model.

#### **NPAC Portal: Effective Industry Collaboration and Communication**

The resources managed by the LNPA are a critical reservoir of Industry expertise and experience, relied upon by Service Providers and lay-people alike—for everything from basic definitions of Local Number Portability to the schedules for upcoming SPID migrations. The LNPA also is a neutral common meeting ground for Service Providers across the Industry, to collaborate on common requirements and optimize cross-Service Provider activities. In recognition of this ongoing requirement, the NPAC portal will offer additional tools for knowledge-sharing and communication across the Industry.

To streamline communication between NPAC users, the Portal will allow for the online creation and maintenance of dedicated User Groups. These can act both as distribution lists for critical outbound notifications, and to control access to configurable user-managed “work-spaces”, within which the Portal can facilitate the exchange of ideas and information between a subset of NPAC Users. This can be particularly beneficial to the NPAC innovation and change management process, as a way to accelerate collaboration between SPs, vendors, and the LNPA.

#### **NPAC Portal: Access to Business Critical Information**

The NPAC Portal will allow access to critical information and processes, including:

- Real-time queries and audits of NPAC transactions
- Bulk-data downloads for SOA/LSMS audit
- Reports on:
  - NPAC data including SVs, network data, network objects, users, and profile setting
  - Inputs and outputs (file-upload, etc.)
  - Basic reporting functions (scheduling, formats)
  - Advanced analytics
  - Dashboards

#### **NPAC Portal: Transition and Continuity**

Following Neustar's record of innovation with maximum continuity and backward compatibility for all NPAC Users, all transfers of functionality between existing interfaces and the NPAC portal will occur subsequent to comprehensive user documentation and training and without additional cost to the Industry.

#### **RFP Required Enhancements**

The NPAC/SMS is constantly evolving and integrating new functionalities. Neustar and the Industry work together to define, approve, and implement new functionality on a regular basis. This section describes required new functionality that was asked about in RFP Section 7.

#### **Security-Related Information**

##### **RFP Required Enhancements: Support of IP Version 6**

Internet Protocol (IP) Version 6 is an evolution of the IP Version 4 that dominates the internet and communications networks today. It is important because it addresses the major concern that public IP addresses under version 4 are nearing exhaustion. Public addresses are expected to reach exhaustion in the United States in the next few years. IP Version 4 provides 32 bits for each address, while the newer IP version 6 provides 128 bits, allowing for many more unique addresses.

Neustar has anticipated this issue well in advance of its arrival. Neustar has been using IP Version 6 natively for over 6 years with commercial services, and is well-versed in IP Version 6 configuration, security, troubleshooting, and architecture. Most Neustar services have to be offered in both IP Version 4 and IP Version 6 worlds, which has its own unique set of challenges. Our teams of CMIP and networking experts have already started work on planning for the evolution of NPAC into the realm of IP Version 6. Neustar has led discussions on this topic in the LNPA Working Group forum, and we expect that group to approve of a solution and for Neustar to complete implementation by the end of 2014, well in advance of IP Version 4 address exhaustion.

The Neustar solution for IP Version 6 includes three important components:

1. **Network Engineering**—Neustar has already implemented IP Version 6 inside its own network. As part of the NPAC implementation, Neustar's networking experts will work with any Service Providers wishing to move to IP Version 6 to plan and coordinate the transition as it relates to NPAC connectivity.
2. **CMIP Application Changes**—the NPAC system conforms to RFC 1189 that defines the implementation of CMIP over TCP/IP. At the heart of the Neustar CMIP implementation is the Open Systems Interconnect (OSI) stack that provides CMIP functionality over TCP/IP. Neustar's CMIP protocol experts will integrate support for IP Version 6 into this OSI stack. Specifically, the IP Version 6 addresses are bigger in size than IP Version 4 addresses, and this will affect how the IP addresses are mapped to OSI addresses. As part of the implementation, Neustar's Operations Team will offer testing services to ensure that both Provider and NPAC systems are functioning properly end to end prior to production rollout.

3. **Other Interfaces**—Neustar is committed to supporting IP Version 6 connectivity to all of the interfaces to the NPAC. This includes the secure FTP site, the new NPAC UI, the new Security-Related Information, as well as any future interfaces.

Neustar views the transition to IP Version 6 as a slow evolution for the Industry. Consequently, all interfaces will remain backward compatible with IP Version 4. We expect that many Service Providers will decide to keep their NPAC related systems on IP Version 4 for many years to come. Neustar is well prepared for the transition as providers evolve their technologies.

**RFP Required Enhancements: Elimination of NPAC/SMS Support of Non-EDR**

Support for non-EDR functionality was eliminated under Statement of Work 86. The NPAC/SMS still must support some non-EDR features, such as the ability to respond to an NPAC user's query for an individual pooled number. Although not a part of the EDR functionality, Neustar remains prepared to provide an NPAC user with a Bulk Data Download (BDD) that includes individual number data for pooled numbers in cases where the NPAC customer is not yet able to process the now-standard EDR BDD.

From the NPAC/SMS customer's standpoint, the removal of non-EDR functionality is complete.

**Future Considerations**

This section describes required future considerations that were asked about in RFP Section 7.

**Future Considerations: Automation of processes between NPAC and PAS**

In collaboration with the Industry, Neustar will rely on its extensive experience as the LNPA and PA to further improve the interaction between the PAS and the NPAC/SMS.

Service Providers rely on accurate information from the PAS and the NPAC/SMS. Based on our experience as the LNPA and PA, we recommend automating the interaction between PAS and NPAC to allow requests from PAS to flow through to the NPAC/SMS. Once processed, the NPAC/SMS can interact with PAS to reflect an update in the status. We also propose the following additional improvements to the coordinating interface:

- **Automate change notifications from the NPAC to the PAS**—NPAC/SMS and PAS can communicate electronically to exchange information on pooling operations that need to be executed in the NPAC/SMS and automatically reflect said completion in PAS.
- **Automate validation of relevant fields in PAS**—Currently, validation is a manual process conducted by the NPAC Pooling Team. Automation will ensure that system checks are performed accurately and in a timely fashion and in keeping with the NPAC FRS while providing real-time and standard error codes for incorrect submissions.

Enabling real-time, automated communication between these two disparate and independent systems will improve overall data integrity and response time.



Neustar is the only vendor with the breadth of knowledge and experience in this domain to recognize the need for and offer solutions to seamlessly link both the NPAC and PAS systems, ensuring that both remain in sync, allowing for significant improvements in pool block provisioning activities for the entire Industry.

**Future Considerations: Combining steps for Intra-Service Provider Ports**

New and expanded uses of the NPAC/SMS have evolved over the past several years, resulting in an increasing amount of information that can be stored in the NPAC database about a TN. It is common for SPs to perform an intra-SP port to provision data for NPAC records. The information about these numbers is established in the NPAC database and is disseminated to the Service Providers' LSMSs.

Because intra-SP porting volumes are likely to grow and intra-SP porting is less complicated than inter-SP porting, (e.g., Intra-SP porting does not require coordination between two different Service Providers), there has been interest in consolidating the Create Pending SV request with the Activate Pending SV request for intra-SP ports. There has been interest in also allowing the Service Provider's SOA to specify that the activation is to be delayed until a specified day and time.

In thinking about how best to accommodate the Industry's interest in allowing Service Providers to consolidate and schedule intra-SP Create and Activate requests, Neustar considered the impact of large quantities of simultaneous delayed activations and whether it might be necessary to coordinate these intra-SP porting activities. We considered suggesting scheduling be done at the LNPA WG, but concluded a Service Provider initiating these intra-SP ports might not want to prematurely indicate its plans publicly. We also considered proposing transaction quotas, much like the approach used with SPID migration planning, but concluded this would be overly complex for the Industry and difficult to administer. And we considered the use of the Mass Update/Mass Port (MUMP) process, since it would avoid publicly revealing the Service Provider's plans and would allow throttling should the quantity of simultaneously scheduled activations have an adverse impact on the LNP ecosystem. However, the Industry's interest is in an improved approach for SOA initiation of intra-SP ports, not in further use of the MUMP processes.

Based on our over 15 years of experience working with the Industry to develop NPAC/SMS functionality, we realized that the one-step SOA Create/Activate capability could be deployed without an artificial scheduling or quota system. This is because intra-SP ports driven by new or expanded uses of the NPAC/SMS should not require large quantities of simultaneous activations, unlike the case where transactions are performed for a network migration. The resulting design would avoid premature exposure of a Service Providers' network plans, allow a reduced Service Provider effort by eliminating the second SOA request message, require only minor changes to the NPAC/SMS platform, and introduce no backward compatibility issues.

Briefly described, the one-step feature would:

- Introduce a new attribute in the intra-SP Create Pending SV request
- Combine the Create and Activate requests to be performed as a single request
- Apply only to intra-SP ports
- Allow SOAs to include the new attribute on a per-request basis (i.e., no opt-in is required)



- Allow SOA to indicate NPAC/SMS should activate the pending SV
- Allow SOA to include a day and time in the new attribute to schedule delayed NPAC/SMS activation
- Provide for immediate NPAC/SMS activation if no day and time value is specified in the new attribute

Implementing a combined create and activate process for intra-SP transactions will greatly reduce the effort required by Service Providers to manage large jobs.

#### Future Considerations: Inter-carrier Communications

While the RFP referenced ICP only, we assume it intended to include LSR, therefore we will refer to this as ICP/LSR in this response. The NPAC/SMS architecture has the flexibility needed to incorporate the ICP/LSR processes that currently precede the NPAC/SMS LNP provisioning process. The existing NPAC/SMS architecture already has proven its flexibility by being able to support periodic changes required by the Industry. Examples include the introduction of Pooling, support of One Day Porting, pseudo-LRN, introduction of new optional fields, and the

Inclusion of ICP in the NPAC will require the expansion of the current NPAC Create and Modify messages utilized for porting between carriers. Existing messages can be expanded easily to include necessary data/fields for pre-port validation, E911, and Directory Assistance.

While the NPAC/SMS infrastructure can support and incorporate the functions performed today in the ICP/LSR process, NANC flows will require changes which in turn will introduce a number of complexities that will need to be worked by the Industry via the LNPA WG. One such complexity is the current use of a Clearinghouse/Service Bureau model. The NPAC/SMS can perform Clearinghouse/Service Bureau functions, but not without major changes to the NPAC/SMS. In addition the NPAC/SMS will need to create ICP/LSR business rules for wireline, wireless, intermodal, reseller, and carrier-specific scenarios. All this functionality will need to exist in the NPAC/SMS. Carriers should keep in mind that ICP/LSR in the NPAC will create transition costs as back-end system changes will be required to support new porting flows.

Wireless ICP can be assimilated into the NPAC/SMS process without difficulty. The <sup>Carrier-to-Carrier Interconnection</sup> makes this change seamless as the addition of new fields to the schema can be published easily. However this requires major changes to carriers' back office systems and SOA systems as they will need to allow SOA/LTI entry, validation, and transmission of a WPR. Carriers also will need to support the validation, acceptance, and rejection of a port request based on a set of agreed upon data fields during the pre-port process.

In order to support Wireline and Intermodal porting (i.e., LSR), the Industry will need to address the standardization of the Wireless and Wireline porting process. Previous unsuccessful efforts at the LNPA WG to develop mapping between LSR/FOC data elements and Wireless/ICP data fields will require resolution to streamline the porting process and making it easy for the NPAC/SMS to support both Wireless and Wireline pre-port activities.

Other complexities are related to the support of non-bonded orders (orders submitted via a UI or fax). One solution can be the elimination of fax and e-mail support as we re-define porting flows. This will require small and medium size carriers to automate their SOA processes and use a mechanized interface into the NPAC/SMS or rely on service bureaus. This will help reduce the time it takes to port a number, but costs could outweigh benefits for small providers.

The bigger question is will ICP/LSR in the NPAC/SMS evolve in the future? How will this work in an environment dominated by mobile and IP services? ICP/LSR is likely to change considerably as communications evolve to mobile and IP. Just as mobile is simpler than wireline, it's likely that the process will continue to simplify as we move to IP.

A broader view should be taken when developing a solution. The Industry should avoid trying to fit the ICP/LSR process as it exists today into the NPAC/SMS. We see no benefit of taking on the complexities of the past, especially while those processes will apply to fewer consumers over time. There are systems and companies that support the current processes and they should continue to do so. However, as the newer, simpler processes are designed, it is these that should be integrated into the NPAC.

Neustar's suggestion is to open up the NANC flows and re-think the way porting is done today to accommodate open interfaces and the ability for carriers to authenticate port requests. This is an opportunity to simplify porting across the board and leverage existing NPAC/SMS functionality. A more comprehensive discussion is needed to ensure ICP/LSR in the NPAC/SMS is not simply taking existing ICP/LSR rules and standards and fitting them into the NPAC/SMS, but rather revamping and rewriting the NANC flows to accommodate future needs and porting in an all IP environment.

We believe that the work developed by the Out-of-the-Box subcommittee of the LNPA WG is an excellent start. The subcommittee was tasked with looking at streamlining existing process to accommodate the FCC's One Day Porting Mandate. Neustar believes this is the right framework to build out an architecture that supports ICP in the NPAC/SMS and address some of the complexities related to this effort.

#### **Future Considerations: PSTN to IP Transition**

The NPAC will be the most important tool Service Providers will use as the Industry transitions from the current TDM (time division multiplex) infrastructure to the future IP (Internet Protocol) infrastructure. The NPAC will be a critical component both during the transition and after. An authoritative method of mapping a TN to some type of Internet address (e.g., DNS name, URI, IP addresses) will be a requirement of the PSTN Transition. Thousands of Service Providers rely on the NPAC today for call and message processing for both TDM and IP networks. VoIP and text messaging have been around for many years and every provider that processes those calls and messages has relied on the NPAC for routing and administrative support. Not only does the NPAC provide the information necessary for these networks, it provides it in a manner that is familiar to companies that rely on advanced technologies for their day to day business operations. The NPAC is collaboratively managed by the Industry with a smooth change management process, it has a strong linkage to the authority of number administration, it has open APIs that process transactions in real time, and it is easily extensible to new features and functionality.



TNs have gone through three generations over the past century:

- **TN 1.0, TN is used as both a name and an address**—The first generation of TNs lasted for most of the 20th Century. In this generation the TN was used as both a name and an address. People used the TN as a name, i.e., “call this number to talk to me”. Networks used the same TN as an address—the first six digits, the CO code, identified the terminating switch. Networks used the CO code to determine how to route the call.
- **TN 2.0, Separation of the name and address**—In the 1990s the Industry implemented LRN (location routing number) technology which associates a dialed TN with a separate routing TN, an LRN which identifies the terminating switch. Networks used IN (Intelligent Network) technology to perform a query on the dialed TN to obtain the LRN. If there was an LRN, the network would use that to route the call. LRN enabled local number portability, number conservation via thousands block number pooling, and the ability for Service Providers to manage their networks in a more efficient manner. However it is important to note that the networks still use a CO Code for routing.
- **TN 3.0, Mapping of the TN to an Internet address**—When companies started implementing IP infrastructure in their networks they needed to map a TN to an Internet address because IP networks can't use TNs for routing. Right now this is mostly done by mapping the TN to the name of the Service Provider identified by the NPAC. The network then translates the Service Provider name into an Internet address that the networks can use to route the call. This process typically is referred to as ENUM. Not only is this process cumbersome—TN->SP->Internet address—it is typically done within a Service Provider's network, not between networks. That is, each Service Provider has to set up their own rules for the translation of TN->Internet address and that Internet address is only usable on that Service Provider's network. This has to change to enable industry-wide IP interconnection.

#### Mapping TNs to Internet Addresses

The creators of the Internet knew to separate the name from the address from the beginning; domain names resolve to IP addresses. Separation of name and address was implemented with TNs in the 1990s and this is a convention that must continue as TNs evolve to IP technology. There must be a method of mapping the TN to an Internet address.

However TNs have needs that domain names do not. TNs are a limited international resource, they are considered sensitive from both a competitive and a privacy perspective, they are tightly linked to emergency services, and TNs will be required to be used by Service Providers and consumers who have both TDM and IP infrastructure for some time.

#### TNs are a Limited International Resource

Due to NAPM numbering conventions, there are 6.4 billion usable numbers in the North American Numbering Plan. However, because specific area codes are assigned to a state, exhaust of an area code occurs frequently, creating a great deal of work and disruption to consumers, Service Providers and regulators. The limited number of TNs requires that their utilization is closely scrutinized, and utilizations evaluated. This means the administrator must have the authority, skill, and experience to monitor, analyze and advise the Industry on use of the resource. Domain names on the other hand do not have the same concern. Second level domain names within a top level domain can have 63 characters and each character has 37 permutations, providing a virtually unlimited number of addresses. While there are about 100M names assigned in the .com domain, there are about 815M TNs assigned in the NANP.

#### **TN Administration Contains Sensitive Information**

Blocks of TNs are assigned to Service Providers which in turn assign TNs to either consumers or to resellers who then assign them to consumers. The fact that they are assigned to Service Providers for inventory provides some insight into their business. The Industry has implemented a Do Not Call database, for people who don't want calls from telemarketers, and the FCC has ruled that entities using auto dialers or recorded messages can't call mobile phones. The NPAC provides a list of wireline numbers ported to mobile service. The registry provider for TN to IP mapping must understand the sensitivities that the consumers, the Industry, and regulators have regarding information about numbering resources.

#### **TNs Will Coexist on TDM and IP Networks**

TDM nodes and networks will be around for some time. There have been suggestions that there should be a date, around 2018, TDM interconnect is no longer required by Service Providers. Presumably the TDM Service Providers would have to make arrangements for their traffic to be handled by an IP provider, which could map TN->Internet address. It's unclear if this will happen—it would require an FCC order—and if so, when it would happen. What is clear however is that the Industry is moving towards IP interconnection and a need to map TN->Internet address. And therefore it is clear that there will be an overlapping need to provide routing for both TDM and IP interconnects. The Industry does not want to duplicate the registry functionality existing in the TDM world with an entirely different registry provider for the IP world. In addition to being inefficient, it would also introduce the opportunity for conflicting data in the separate systems.

The Industry needs a TN->Internet address mapping solution that meets the needs of both TDM providers and IP providers for the foreseeable future. This system would need to support a real time interface for both, i.e., CMIP (current interface), and more web centric interfaces, i.e., web services interface (planned as part of NANC 372). The provider would need to understand all of the complex issues that are related to TNs such as conservation, competition, privacy, emergency services and the needs and capabilities of both TDM and IP providers.

The NPAC is the right tool and Neustar is the right provider to enable the transition of the PSTN from TDM to IP. The NPAC provides real time addressing information for both types of providers today. It is the state of the art for providing addressing data related to TNs. In addition, Neustar is an active Industry participant in all matters related to numbering. Not only are we the LNPA, we are also the NANPA and the PA. The Industry, Service Providers, vendors, regulators and others rely on Neustar as a source for numbering information and expertise. We are industry thought leader in the future of numbering. And we have the operational expertise to manage consensus and implement new processes and procedures related to numbering.



# Security-Related Information



# Security-Related Information



# Security-Related Information

# Security-Related Information



- **Incident management system**—pertinent information about events is recorded and managed as incident tickets. Neustar uses Service-Now as the primary incident management system for ticketing incidents managed by the Neustar NOC. Service-Now integrates with Netcool, the event management system to track the event from beginning to resolution.

### **NOC Monitoring Processes**

The NOC operates 24x7x365 and is managed by highly trained personnel who monitor and manage the NPAC infrastructure, triage production events via Security-Related Information , as well as other Network Management tools. Security-Related Information

# Security-Related Information

# Security-Related Information



NOC processes are designed using proven methodologies derived from Information Technology Infrastructure Library (ITIL) foundations. ITIL is a set of practices, processes, procedures, tasks and checklists for IT service management. This streamlined and repeatable process ensures the proper response to an event. Automation of notifications provides the fastest method for addressing the event. Integration of the event management and incident management systems ensures the best possible documentation and mitigation of service affecting events.

## **Monitoring at Each Layer**

Neustar has established monitoring for all Layers of the NPAC/SMS architecture and NOC personnel quickly engage when appropriate.

### **Data Center Layer Monitoring**

Neustar strictly monitors and control access to the data center facilities 24x7x365. Security-Related Information

Security-Related Information



**Network Layer Monitoring**

The Network Layer is where Neustar customers connect to the NPAC/SMS. This Layer is designed to be highly available because of its critical nature and because Neustar coordinates with our customer's local IXCs.

Security-Related Information

In addition to utilizing SNMP agents and traps, the network engineering and operations teams also employ the following tools to monitor the network:



Neustar, Inc. 10/15/2015





# Security-Related Information

# Security-Related Information

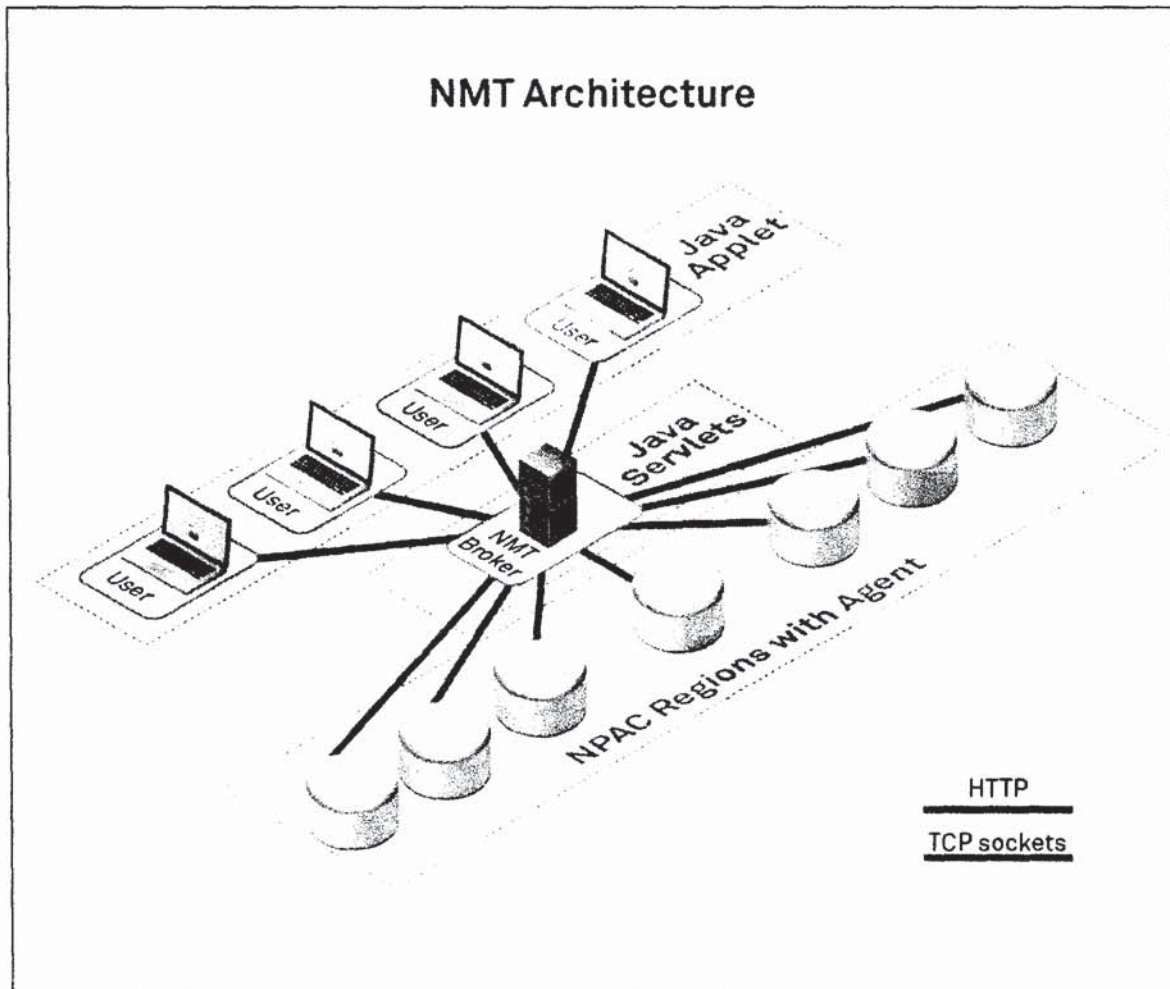


# Security-Related Information



# Security-Related Information





**Exhibit 1.2.3-6:** NMT provides an overview of all NPAC/SMS service-critical metrics.

As Mass Update Mass Port jobs are executed, the system tracks queues for LSMSs. If these queues rise above configurable thresholds, all jobs are suspended. This prevents failed LSMS broadcasts and ensures all LSMSs are synchronized. The system monitors the success rate of all work within each job. If a job has too many failures, it is paused so it can be reviewed and corrected. With both of these features, NPAC personnel are alerted whenever the system preempts a job.

Neustar has developed an extensive set of queries that analyze the production system for logical inconsistencies and that identify potential problems with Service Provider systems. For example, if an LSMS remains on the failed list of a subscription version for longer than one day then the subscription version is included in a report that is e-mailed to NPAC support personnel for investigation. This allows Neustar to remain in front of issues before they cause actual problems. Analysis of an issue is performed on copies of the production database to prevent interference with online processing.

# Security-Related Information

# Security-Related Information



# Security-Related Information





# Security-Related Information



# Security-Related Information

# Security-Related Information

**August 7, 2013**





# LNPA in the U.S.: By The Numbers



## Capacity

- 635 Million TNs
- 1.4 Million Updates per Day
- 604 SOA/243 LSMS Associations
- 12 Billion CMIP Operations Every Year



## Performance

- 2,268 SLR Measurements
- 3,500+ User Survey Respondents
- 136 Article 14 Categories
- 10 Annual Neutrality and Service Related Audits



## Components

- 2 Fully Redundant Data Centers
- **Security-Related Information**
- Hundreds of years of dedicated unique experience
- 500+ NANC/ILL Change Orders




## Industry Value


- \$40 Billion in Total Subscriber Value
- 100 Thousand New TNs Every Day
- Technology Upgrades, M&A, Emergency Preparedness

# Our Resume: Corporate Overview








- Publicly Traded U.S. Company (NYSE:NSR)
- 1,600 Employees
- Headquartered in Sterling, Virginia—14-year Independent Operating History
- Provides Real-time Information Services for More Than 7 Billion Physical and Virtual Addresses, Serving Nearly 400,000 Queries Every Second
- Broad Industry Participation



U.S. / Canada  
LNPA  
Brazil/  
Taiwan LNP



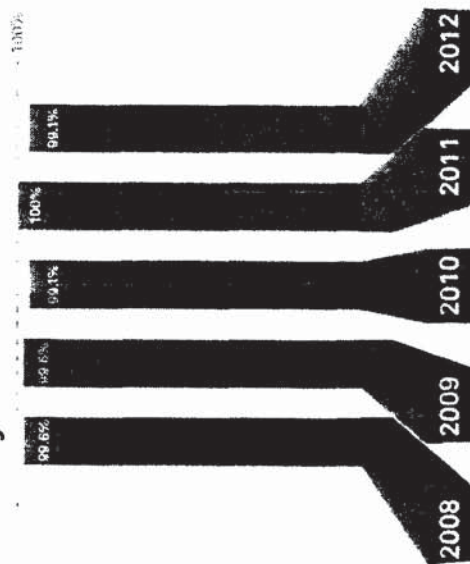
NANPA  
Pooling  
iTRS

Service		Order Management Services		Common Short Codes
Neutrality		IP Addressing & Routing		Security & Reliability Services
Industry Collaboration		TLD Registries		Neustar Information Services
Performance				
Security		Neustar Enterprise Services		

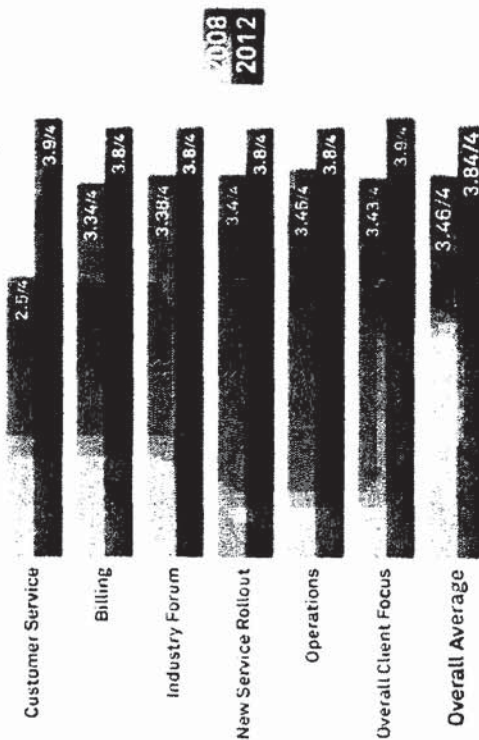


# Our Resume: A 360° View of Performance

## Industry Validation: SLR Results



## User Validation: Customer Survey Scores



## Third-party Validation: Article 14 Audit Scores

Category	2008	2012	Trend
Datacenter Environment Overall Score	4.60	4.67	▲
Network Infrastructure Overall Score	4.70	4.73	▲
Storage Systems Overall Score			▲
Security Overall Score			▲
Software Release Management Overall Score	4.50	4.66	▲

## Record of Performance

### Help Desk

Overall Customer Satisfaction score (2012)	3.84/4.0
Help Desk First-call Resolution	80%+
Compliance with Performance Metrics	99.9%+
Accuracy on 55,000 MUMP Requests	99.9%+

### Certifications

ISO 9001:2000 Certification (2008-2012)	
Sarbanes Oxley	

### Service Audits

Gateway Evaluation Process (GEP)	100%
Benchmarking Process	100%
New User Evaluation (NUE)	Affirmative
Local Number Portability Enhanced	100%
Analytical Platform (LEAP)	100%
Intermodal Ported Telephone	
Number Identification (IPTN)	100%

REDACTED--FOR PUBLIC INSPECTION

Our Resume: Under the Hood

Technology

# Security-Related Information



REDACTED--FOR PUBLIC INSPECTION

Our Resume: Under the Hood

Technology

# Security-Related Information

REDACTED--FOR PUBLIC INSPECTION

Our Resume: Under the Hood

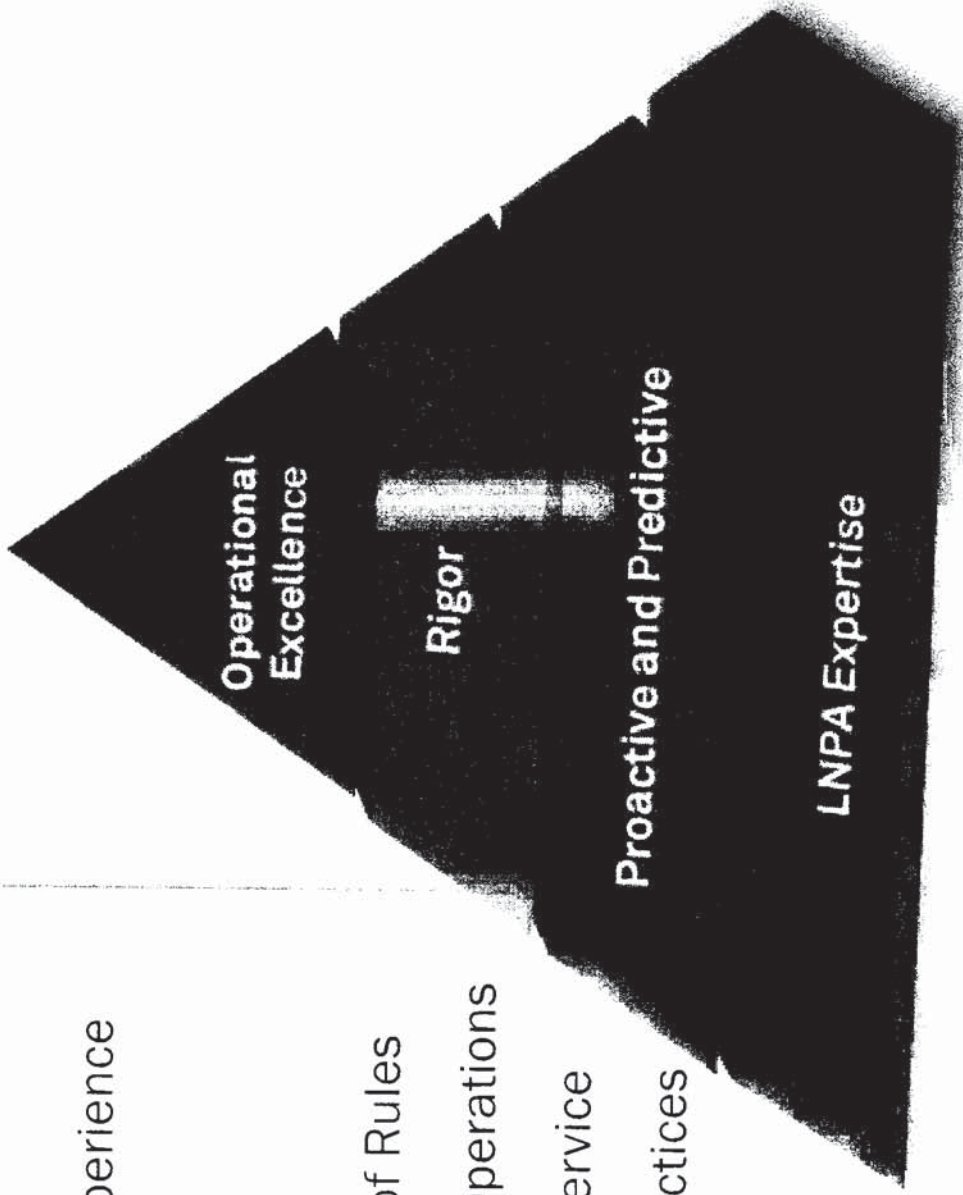
Monitoring

# Security-Related Information

# Our Resume: Under the Hood

People and Expertise

- 100's of Years LNPA Experience
- Trust and Partnership
- Full Accountability
- Stringent Enforcement of Rules
- Direct Extension of SP Operations
- Proactive Approach to Service
- Market-leading Best Practices



# Our Resume: Neutrality

neustar

## Total Corporate Commitment

- ✓ Board of Directors Composition
- ✓ Debt & Equity Holder Restrictions
- ✓ TSP Ownership Restrictions
- ✓ Quarterly C-level Attestations



## Comprehensive Approach

- ✓ Universal Code of Conduct
- ✓ Annual Training & Quarterly Certifications for ALL Employees
- ✓ Independent Neutrality Officer

## Industry Confidence

- Protection of Confidential Data
- First-in/First-out Transaction Processing
- Connectivity, Help Desk, Testing, Release Management
- Industry Change Management



# Best Value Proposal: U.S. LNPA



## Scope

- Fixed Number Portability
- Mobile Number Portability
- VoIP Portability
- Inter-modal Number Portability
- Thousand-block Distribution / EDR
- Reseller Management
- Service Type Identification
- Voice, SMS, MMS URI Attributes
- Native Number Identification
- Emergency Preparedness
- Network Migrations
- Law Enforcement Support

## How it works

- All-Call-Query
- Location Routing Number
- CMIP, GUI, Security Related Information
- Real-time Distribution

## Services

- User Registration and Administration
- Mass Porting/Project Management
- Industry Knowledgebase
- Billing Administration
- Dedicated Testing Support
- End-user Training
- Ecosystem Monitoring and Recovery
- Industry-wide Failover Testing
- Interactive Voice Response
- LNP Enhanced Analytical Platform
- Wireless DNC Compliance
- Automated and Custom Reporting
- Disaster Recovery Services

## Supported Volumes

- 630 Million TNs Under Management
- 500+ Million Updates Per Year
- 12 Billion Industry Interactions Per Year
- 1,000+ Connected Service Providers
- Seconds to Update Networks
- Less Than 2 Hours Average Mobile Porting Interval

# India MNP Services



## Scope

- Fixed Number Portability
- Mobile Number Portability
- VoIP Portability
- Inter-modal Number Portability
- Thousand-block Distribution / EDR
- Reseller Management
- Service Type Identification
- Voice, SMS, MMS URI Attributes
- Native Number Identification
- Emergency Preparedness
- Network Migrations
- Law Enforcement Support

## How it works

- All-Call-Query
- Location Routing Number
- CMIP, GUI, Security-Related Information
- Real-time Distribution

## Services

- User Registration and Administration
- Mass Porting / Project Management
- Industry Knowledgebase
- Billing Administration
- Dedicated Testing Support
- End-user Training
- Ecosystem Monitoring and Recovery
- Industry-wide Failover Testing
- Interactive Voice Response
- LNP Enhanced Analytical Platform
- Wireless DNC Compliance
- Automated and Custom Reporting
- Disaster Recovery Services

## Supported Volumes

- 1,000+ about 100+ Connected Service Providers
- Seconds to Update Networks
- 630 Million TNS Under Management
- 500 Million+ 40 Million Port Requests Per Year (Across 2 Vendors)
- 12 Billion Industry Interactions Per Year
- 2 Hours 168 Hour Average Mobile Porting Interval



# Best Value Proposal: A History of Innovation

- Security-Related Information
- Pseudo-LRN
- One-day Porting
- Performance Dashboard
- Voice/SMS/MMS/URIs
- LEAP/WDNC
- Reseller Management
- VOIP Porting
- Intermodal Porting
- National Pooling
- Network Management
- Fixed - line Porting
- Intermodal Porting
- National Pooling
- Network Management
- Voice/SMS/MMS/URIs
- LEAP/WDNC
- Reseller Management
- VOIP Porting
- Intermodal Porting
- National Pooling
- Network Management

2015-2020

2015

2009

2003

1997

1997 2003 2009 2013

Inter-SP Ported

Intra-SP Ported

Pooled



# Best Value Proposal: What You've Asked For and More

## RFP Requirements

### Named Challenge Orders:

- Sunset of non-EDR
- Ethernet Connectivity
- SOA/LSMS Interface Protocol Alternative (XML Interface)
- NPAC Support for CMIP Over TCP/IP/Support of IPv6
- Automated Processes Between NPAC and PAS
- Combined Steps for Intra-SP Ports
- Inter-carrier Communications Process in the NPAC
- Future Mandated Changes

## Investments

### Performance Increases

- Automated Local /Site Failover (SLR 1/3)
- Connection Optimization (SLR 5/6)
- 24x7x365 Help Desk (SLR 14)

### Enhanced Service

- Automated Testing Scenarios
- Online User Registration/Account Management
- Online User Training via NPAC Portal

TL 9000 Quality Management

ISO 27001 Information Security

ISO 22301 Business Continuity

- Consolidated User Interfaces
- Web 2.0 Community & Customer Support Tools
- Market-Leading Information Analytics Platform

### Future Industry Innovation



# Best Value Proposal: Anticipating Future Needs

<ul style="list-style-type: none"> <li>Fixed - line Porting</li> </ul>	<ul style="list-style-type: none"> <li>Intermodal Porting</li> <li>National Pooling</li> <li>Network Management</li> </ul>	<ul style="list-style-type: none"> <li>Voice/SMS/MMS/URIs</li> <li>LEAP/WDNC</li> <li>Reseller Management</li> <li>VOIP Porting</li> </ul>	<ul style="list-style-type: none"> <li>Secure-Ported Information</li> <li>Pseudo-LRN</li> <li>One-day Porting</li> <li>Performance Dashboard</li> <li>Voice/SMS/MMS/URIs</li> <li>LEAP/WDNC</li> <li>Reseller Management</li> <li>VOIP Porting</li> <li>Intermodal Porting</li> <li>National Pooling</li> <li>Network Management</li> </ul>	<ul style="list-style-type: none"> <li>IP Interconnect</li> <li>Fixed-line SMS</li> <li>CC1 Delegation</li> <li>M2M Admin</li> <li>Registry Consolidation</li> <li>Device Registry</li> <li>Individual TN Pooling</li> <li>Certificate Authority</li> <li>Secure-Ported Information</li> <li>Policy-based Distribution</li> <li>Secure-Ported Information</li> <li>Pseudo-LRN</li> <li>One-day Porting</li> <li>Performance Dashboard</li> <li>Voice/SMS/MMS/URIs</li> <li>LEAP/WDNC</li> <li>Reseller Management</li> <li>VOIP Porting</li> <li>Intermodal Porting</li> <li>National Pooling</li> <li>Network Management</li> </ul>
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1997

2003

2009

2013

2015 - 2020

REDACTED--FOR PUBLIC INSPECTION

Best Value Proposal: Projected Transaction Growth

**HIGHLY CONFIDENTIAL**

# Best Value: Our Proposal

Current Contract		HIGHLY CONFIDENTIAL
Floors & Ceilings	Yes	HIGHLY CONFIDENTIAL
Annual Escalator	6.5%	HIGHLY CONFIDENTIAL
Fixed Credits	Expired in 2011	HIGHLY CONFIDENTIAL
Incentive Credits	Expired in 2011	HIGHLY CONFIDENTIAL
SOW Charges	Incremental	HIGHLY CONFIDENTIAL
Direct Charges	Unchanged Since 1997	HIGHLY CONFIDENTIAL
SLR Penalties & GEP Credits	Unchanged Since 2001	HIGHLY CONFIDENTIAL
Performance Bond Coverage	Unchanged Since 1997	HIGHLY CONFIDENTIAL

## Best Value: Our Proposal

### Net Benefits

- ✓ 100% Predictability
- ✓ Net Price Never Exceeds 2015
- ✓ [REDACTED] in Year-one Savings







# Transition: LNPA Perspective

## Neutrality

## Performance

Service Availability 99.99%

All SLRs Met or Exceeded | Exceptional Customer Service

## People & Expertise

15+ years Operating the US NPAC | No Outsourcing | Industry Trust and Credibility

## Administration Services & Operations

## Security & Monitoring

243 LSMS's

604 SOA's

Data Center

Network

SAN

Billing System

## Neutrality

## Performance

Service Availability 99.99%

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## Transition: What's at Stake

Beyond  
Year 1  
\$1B+

### Additional Cost and Risks:

- Impact to Strategic Priorities
- Loss of Subscriber Confidence
- Reduced Brand Value
- Stalled Network Transformations
- Consumer Complaints to FCC

### System and P

- Database and System Transition Errors
- Transaction Processing Errors
- System Outages
- Public Safety Impacts - 911 Services

\$648M

Year 1  
\$719M

### Set-up Costs:

- SOA/LSMS Connectivity
- Vendor and Service Provider Testing
- End-to-End Industry Testing

\$71M



## Conclusion

### What's at Stake ?

- **Certainty**
- **Innovation**
- **Peace of Mind**

**neustar**